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COVER: Lioness (*Panthera leo*) during light rainstorm in Kruger National Park, South Africa

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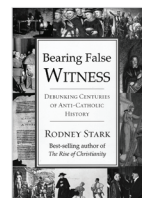
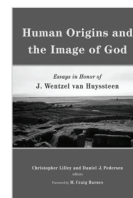
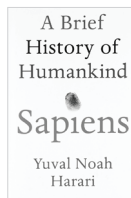
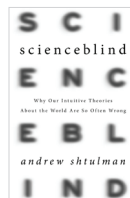
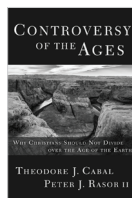
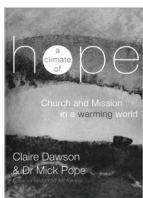
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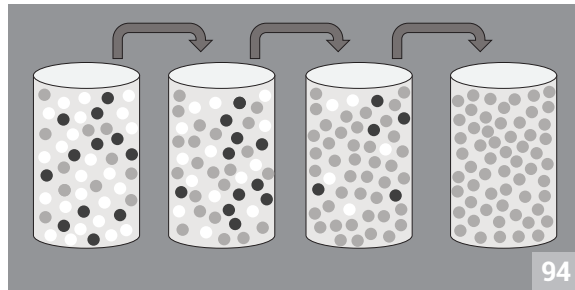
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Revisiting the problem of very old landforms

Michael J. Oard

It seems strange that Twidale has written three similar articles on older landforms, attempting to convince fellow geomorphologists that they are, in fact, exceptionally old. Twidale's first article was written in 1976,¹ in which he argued that landforms could be tens to hundreds of millions of years old. This was contrary to popular belief articulated by Thornbury in 1954:

"Little of the earth's topography is older than Tertiary [Paleogene and Neogene], and most of it is no older than Pleistocene."²

Twidale revisited the problem again in 1998³ then dusted off the arguments and discussed the problem further in 2016, with a focus on Australia.⁴ Unfortunately, despite these more recent publications, little new information has been added since 1976. So why has he been persistent over 40 years? His main reason seems to be that very old landforms, such as planation surfaces and inselbergs, are contrary to the uniformitarian principle but still exist.

Modern erosion rates too high

According to the uniformitarian principle, present day rates of erosion are several orders of magnitude too rapid for the landforms to have survived to the present day.⁵ Erosion rates are based mainly on climate and relief and vary significantly, with the highest rates of erosion being in high mountains with high rainfall. For example, a mountain basin in Taiwan has been measured to erode at 2.65–5.17 mm/yr.⁶ But even dry areas, like southern and central Australia, have erosion rates of 5–35 mm/1,000 years.⁷

On this basis the world's average rate of erosion must be over 40 mm/1,000 years.⁵ At the present rate of erosion, all of the continents would be reduced to sea level in 10 Ma based on river output to the oceans.⁸ However, there are other processes that would slow erosion. Several secular geologists have estimated that this reduced rate would flatten all of the continents in less than 50 Ma.

Despite Twidale's writing, it appears many geomorphologists still don't believe the landforms are that old. Indeed Twidale complained in his 2016 article:

"Hence the almost universal view that with the exception of exhumed forms, few landscape features predate the late Cenozoic [i.e. Miocene, Pliocene, Pleistocene, and Holocene in the geological timescale]."⁹

However, Twidale believes these landforms are much older than the late Cenozoic.

Why are landforms so 'old'?

Radiometric and fossil dates are primarily what Twidale and other

geomorphologists and geologists point to when claiming a landform is very old, as apparently deep time is more sacred among secular scientists than uniformitarianism. Many of these so-called 'very old' landforms are in Australia.^{10–12} Some planation surfaces in Australia, those that have not been exhumed (during the Flood), have remained flat since the Paleozoic or Mesozoic. For instance, the planation surface on Kangaroo Island, South Australia (figure 1), is believed to be over 150 Ma old.¹³ Ollier claims a super-old planation surface of Precambrian age, older than 540 Ma, is the Kimberley Plateau of north-west Australia.¹⁴ Such old planation surfaces also exist in other parts of the world:

"Surfaces and forms of earliest Cenozoic and Mesozoic age ranges [~50–250 Ma] persist in many parts of the world".¹⁵

Twidale and Campbell further state:

"In geological terms, in other words, there ought to be no landforms or land surfaces, even in areas eroded according to the scarp retreat model, of an age greater than Oligocene [about 30 Ma], and certainly no



Figure 1. Kangaroo Island, South Australia

older than the Cainozoic [less than 65 Ma].”¹⁵

How could these landforms have survived for so many eons, given the fact that they are eroding today at relatively high rates? It is possible to claim that continuous uplift rejuvenates mountain ranges, but that would not account for the preservation of old planation surfaces or inselbergs, which would have continued to erode away. Since many mountain ranges still have mountaintop planation surfaces,^{16,17} rejuvenation is not a plausible explanation.

Any new suggestions for preserving mechanisms?

I have previously dealt with various mechanisms that could possibly reduce surface erosion rates. These include a resistant cap rock, a dry climate, and preservation by glaciers. I also pointed out that within the long-age paradigm Australia’s mostly dry climate today was not always so in the past.¹⁸ According to plate tectonics, Australia was recently in the wet mid latitudes where erosion would have been faster.

Twidale and others continue to search for preserving mechanisms, believing the dates are absolute and there must be an explanation because the landforms *still exist*:

“Yet, many features that are several tens of millions, or even a few hundreds of millions of years old, remain incredible. On the other hand, it can be argued that since these landforms exist, they must be possible.”¹⁹

This is the logical fallacy of begging the question.

In his most recent article Twidale now seems to downgrade the activity of rivers and streams:

“Third, though widely active in shaping the land surface, rivers *per se* are not as effective as has been supposed (e.g. Baker, 1988).”²⁰

He hangs onto the idea of resistant rock at drainage divides, but he overlooks the consequences that slow erosion at these locations would only preserve *ridge landforms* longer. It does not help the preservation of many other landforms, such as planation surfaces and inselbergs, which are extensive in Africa and Australia.

Powerful, objective evidence against deep time

What are claimed to be ‘very old’ landforms, especially planation surfaces and inselbergs, continue to be objective evidence that the reliability of radiometric and fossil dates is greatly exaggerated.¹⁸ According to erosion rates today, there should not be any planation surfaces older than a few hundred thousand to a few million years within the uniformitarian timescale. This result confirms what creation scientists have been saying for years; that there is something seriously wrong with dates that number in the millions and billions of years. This agrees with the RATE (Radioisotopes and the Age of The Earth) project which demonstrated radioactive dates have serious theoretical problems, and proposes that there was a period of accelerated radiometric decay during the past approximately 6,000 years of biblical Earth history.^{21,22} However, the origin of landforms that are difficult, if not impossible, to explain by uniformitarianism, can be readily explained by Flood runoff.^{23,24}

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Do 'laterite' soils take a million years to form?

Shaun Doyle

A common claim by long-agers is that 'lateritic' soils (red, subtropical soils high in iron and/or aluminium) are 'highly weathered'. That is, they typically form through slow chemical weathering, which means it can take millions of years to produce even one metre of soil.

Standard story of laterite formation

These types of soils are known as Oxisols and Ultisols. In Australia, they are known as Ferrosols and Red Kandosols, and some older names for these soils are Krasnozems and lateritic soils. However, for the rather broad typing of these soils, their origins are held to be pretty similar. The standard story goes something like this: in wet tropical (and subtropical) climates, minerals such as silicates are slowly dissolved and leached out of the soil, leaving the more insoluble iron and aluminium oxyhydroxides behind as the major soil constituents. These soils form part of what is known as the 'lateritic profile' (figure 1). This can be altered somewhat, e.g. if the climate has relatively little rainfall, this process is thought to be even slower, extending out over several million years.¹ These soils are thus called 'highly weathered' (when 'mature') because they are quite clearly altered rather drastically from what was likely their original state. It is the severity of the chemical alteration that leads long-agers to postulate million-year ages for these types of soils

Difficulties with the standard story

The first problem with this story is that nobody has actually observed a mature Ultisol or Oxisol form, so estimates of the time needed for their formation are dependent on one's assumptions about the past. It's usually not even the case that soil formation rates are directly measured to obtain dates. Rather, the dates and soil formation rates are usually derived from some sort of forensic dating method of constituents in the soil or associated volcanic rocks,¹ or sometimes through fossil 'dating', and not from direct measurements of soil formation.

Sometimes, laboratory experiments assuming 'classic' laterite formation conditions are appealed to for laterite formation rates (which include the Oxisols/Ultisols on top), and are also used to ground the notion that it takes a million years to produce 30 cm of soil.²

However, even these measured rates face numerous counterexamples in the field: "Laterites on the foreshore at Darwin, Australia, include automobile bodies and other debris attesting to continued formation".³ This is a systemic problem—observed soil formation (and chemical weathering⁴) usually progress faster than long-agers typically assume.^{5–7} Moreover, soil formation typically occurs in an asymptotic rather than linear manner—it starts off fast and progressively slows through time.⁵ Therefore, even if we take the soil formation rates as genuine, most of what we are measuring today in many 'stable' soils such as Oxisols are actually historic *minima* rather than historic averages.

Another problem with these experiments is the conditions they assume. In his analysis of these experiments, Nahon does not consider the possibility of catastrophic conditions—e.g. hydrothermal alteration of the bedrock causing Fe and Al enrichment. As

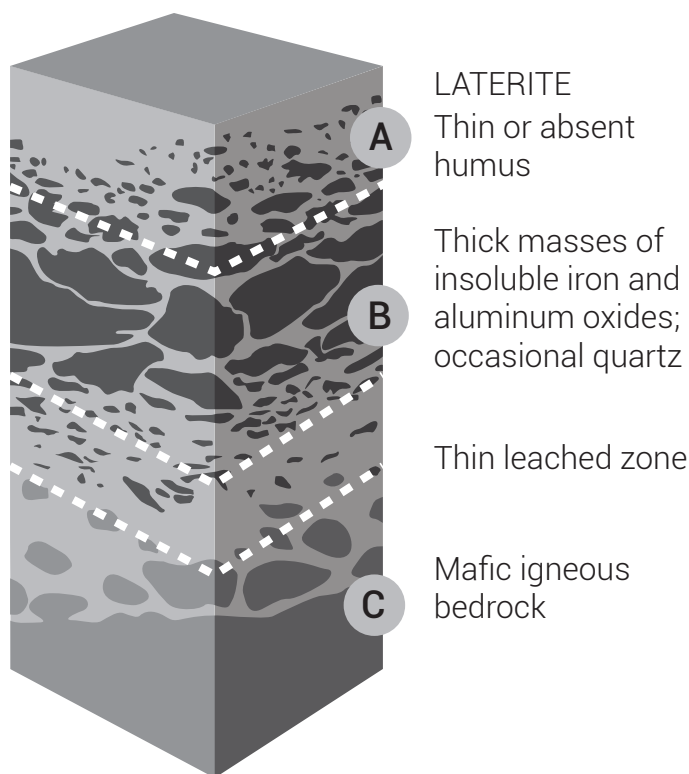


Figure 1. An idealized laterite profile is relatively simple and replicable.

paleopedologist Dr Gregory Retallack warns:

“Alumina enrichment can be caused both by hydrothermal alteration and by weathering, so that care must be taken in interpreting aluminous rocks [bauxite] in highly deformed and very ancient terranes.”⁸

I would suggest that in the context of competing frameworks this can be applied in principle to *all* cases of Fe and Al enrichment, especially in the light of research done since Retallack wrote this comment (see below).

Nahon does, however, acknowledge that these laterites can be relict, which complicates the dating of laterite profiles (including the soils on top of them). However, the issue of the initial conditions of the parent material takes on a new significance in the light of the Genesis Flood. Most long-agers tend to assume the initial conditions for the parent material of these soils was unaltered bedrock—an assumption that simply does not fit with the Flood explanation. As Retallack said, separating weathering from hydrothermal alteration as the cause of Al and Fe enrichment can be tricky. Moreover, there are instances of supposed ‘paleosols’ of Oxisols such as bauxite deposits where it is practically certain that the bauxite was produced geologically rather than through soil formation.^{9,10}

Indeed, in many cases there may be little relationship between the soil parent material and the subjacent regolith. Klevberg and Bandy note:

“Although much effort has been exerted in determining epigenetic pathways in response to climate, many physils identified in North American soils appear to be inherited from parent material unrelated to subjacent regolith.”¹¹

This means much of the material in soils is likely explained by transport rather than *in situ* weathering.

Another problem with the ‘orthodox’ laterite tale is the geographical distribution of Oxisols and Ultisols. Many are (or were, in the case of bauxitic and lateritic paleosols according to the evolutionary framework) located in climates not conducive to the conventional story of their formation.¹² Note that this is also the case for many Ultisols in south-eastern Australia. In this case, many investigators propose that these soils were either deposited from elsewhere or developed from already-weathered bedrock.

Another solution?

Not even ‘classical’ tropical climate lateritic profiles (and their Oxisols and Ultisols) are immune from revision. Deposition has even been hypothesized as the origin of the Weipa Bauxite.¹³ Weipa fits the typical climatic picture perfectly, so why the change? The researchers point out one very telling fact:

“If one takes a moment to think how a 3-m thick layer of loose pisoliths could form over an area of about 11,000 km² by *in situ* weathering, one will immediately recognise the problem we have with its origin.”

This is one of many signs in the recent literature that researchers are looking for alternative (typically more catastrophic, or at least more conducive to catastrophic formation) ways to explain laterites and bauxites that do not fit the traditional ‘*in situ* weathering’ explanation.^{14,15}

Of course, even the new hypotheses are still given in a ‘deep time’ context, but there is room for development of those ideas in a Flood context. They essentially posit that lateritic material formed through the lateral movement of iron in solution into river valleys (as opposed to the vertical movement of the traditional story). They cemented there, and then through extensive

erosion of the surrounding land relief inversion occurred, leaving lateritic duricrusts on top of mesas (and perhaps even entire plateaus, such as Weipa Plateau). This may be somewhat plausible in a deep time framework of a river valley, but it may still struggle to explain the scope of bauxite deposits the size of the Weipa Plateau. However, the special conditions of the Flood provide the hydrothermal and chemical conditions needed for fast production of Al and Fe enriched minerals, enable the mass movement of such material, and provide a large-scale mechanism for relief inversion in the latter stages of the Flood to create the lateritic mesas *and* plateaux the size of Weipa Plateau.

As for the Ultisols and Oxisols as soils—their formation probably depends more on the initial post-Flood state of their parent material than on the climate for their formation. This parent material was likely chemically altered during the Flood, possibly by hydrothermal solutions. Moreover, climates were probably wetter just after the Flood, with lots of residual organic matter and water still at or near the surface, so soil-forming mechanisms probably operated much faster then than now.¹⁶

Conclusion

The recent literature on soils provides some potential solutions for the formation of Ultisols and Oxisols within a Genesis Flood framework. Although more work clearly needs to be done on this, the general direction of some of the more recent literature on laterite and bauxite formation is encouraging. It appears to provide some useful ideas that can not only help us refute the ‘orthodox’ speculations of long-agers about these types of soils, but suggest avenues for providing biblical explanations of these rather enigmatic formations.

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Is the male reproductive system poorly designed?

Jerry Bergman

One of the latest proofs of human evolution is the poor design claim, namely that an intelligent Creator would not design some human body part in a certain way. An example is the human male reproductive system, which Rowe listed as number four in his list of the top 10 design flaws in the human body.¹ The human male reproductive system poor design claim focuses on the view that “if testicles were designed”, then why didn't God “protect them better. Couldn't the Designer have put them inside the body, or encased them in bone” like the brain which is surrounded by a hard skull?²

Concluding that a body structure is poorly designed, as Oxford University Ph.D. Professor Hafer claims, instead of asking *why* the existing design exists, is a science stopper. The ‘why’ question motivates research into the reasons for the design. When this approach was applied to the human appendix, the tonsils, the backward retina, and the many putative other examples of supposed poor design, good reasons for the existing designs were found in all cases. The same is true of the male reproductive system.

Hafer explained that when she was looking for new approaches to refute Intelligent Design, she knew she “had a winner when ... in the middle of an Anatomy and Physiology lecture” she concluded that the male reproduction system “is a great first argument against ID”.³ She believed that she also had a good “political-style argument” against ID.⁴ Her main argument is that because male testicles are outside of

the body, they are prone to injury. She adds that in many animals, including cold-blooded reptiles, they are located inside the body where they are fully protected.

The reasons for the design

Male testicles exist outside of the body in humans and most mammals for several important reasons, including effective regulation of scrotal temperature for optimal spermatogenesis development. Another reason is to keep sperm relatively inactive until they enter the warm confines of the female reproductive system.⁵ Even just a few degrees above the optimal temperature is detrimental to both sperm production, specifically in the later stages of spermatogenesis, and sperm maturation.⁶

A low ambient temperature is essential for normal spermatogenesis in humans and *most* mammals because the enzymes required for the process are denatured if their temperature is not finely regulated. One study in mice found temperatures of 37°C or higher caused “a significant reduction in the percentage of motile sperm”, producing an increase in the number of spermatozoa with plasma membrane damage.⁷ The mammal exceptions include monotremes, mammals that lay eggs instead of giving birth to live young, and have intra-abdominal testes. Also, some placental mammals, such as insectivores (shrews, hedgehogs, and moles), plus elephants and hippopotamuses, all have intra-abdominal testicles.⁸ One factor is externalized testes are found only in certain mammals whose lifestyle involves jumping, leaping, or galloping. In large animals with this lifestyle this behaviour would be expected to put great pressure on the testicles and even expel their contents by creating concussive hydrostatic rises in peritoneal pressure.⁹

Compared to core body temperature, the average temperature drop achieved in the current design architecture is ideal. The sperm production system is maintained at a temperature very close to 4°C cooler than the normal body temperature of 37°C.¹⁰ An increase in temperature by as little as 2°C adversely affects sperm formation. The result of this 2°C increase in humans includes a lower sperm count, and a significant increase in the number of abnormal sperm.¹¹

If the testes were inside the body, the enzymes sperm require to be healthy would be denatured in a matter of hours. New sperm would have to constantly be produced to allow humans to be fertile year-round, as is normal for humans. This issue would not be a concern for most animals that are fertile only during very short windows each year.

Several complex mechanisms exist to ensure that the 4°C difference is maintained at 37°C down to 33°C. When testicle temperature drops below 33°C, a complex feedback system causes the cremaster muscle that surrounds the testicles to contract, which moves the testicles closer to the warm 37°C body in order to compensate for the heat loss.¹² When their temperature rises above 33°C, the cremaster muscle relaxes, allowing the testicles to move away from the body. This insures that the ideal male reproductive system temperature is maintained within a very narrow tolerance of the 33°C ideal.

Their 33°C temperature is also maintained by increasing or decreasing the surface area of the tissue surrounding the testicles, the scrotum, allowing faster or slower dissipation of their heat. It does this by expanding like a wrinkled balloon does when air is blown into it. Furthermore, scrotal skin is very thin, allowing the testes

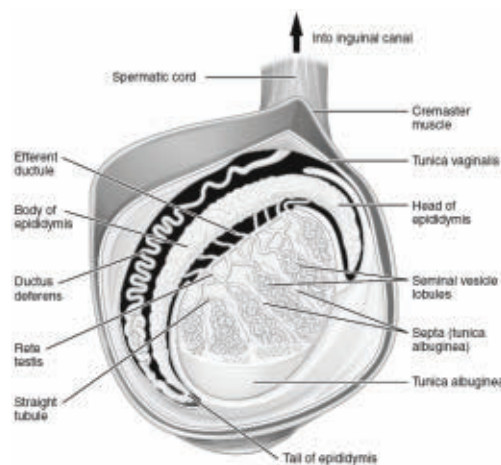


Figure 1. Diagram of a male testicle showing its internal structure (From Wikimedia Commons)

to easily lose heat into the surrounding environment. The air circulating around the scrotum sack further helps to facilitate the cooling of the scrotal skin, in turn helping to cool the sperm development system.

Furthermore, to maintain the proper temperature, the arteries carrying blood into the scrotum run alongside the veins that carry blood away. This sophisticated heat-exchanger mechanism lowers the temperature of the blood supply travelling to the testicles.¹³ The warm arterial blood coming from the abdomen loses heat to the cooler venous blood coming away from the testes. The result is that the blood is cooled slightly before even entering the scrotum. For these reasons, the existing system is an excellent design, well known to engineers as *counter-current exchange*, to maintain optimal spermatogenesis temperature control. This design is widespread in biological systems.

Year-round fertility

One major reason for the rigid temperature regulation is because humans are fertile throughout the entire year, and virtually all animals with internal testicles, including all

cold-blooded vertebrates and birds, are not. Most animals need to be fertile only during a very short period of time during their mating season. This is often when outdoor temperature allows maintenance of the proper temperature for spermatogenesis, such as is the case for reptiles. In harmony with this observation, Freeman found that “taxa with internal testes produce large volumes of low-quality sperm while taxa with scrotal testes produce smaller volumes of higher-quality sperm”.¹⁴

Another reason for the rigid temperature regulation is that sperm have a very short lifespan and must be stored at lower than body temperature to keep them dormant longer. Sperm are stored in the epididymis where they mature, and the warmth of the female reproductive system serves to help activate them. If the testicles were located inside of the male body, the sperm would be activated much sooner, and thus, given their short lifespan, measured in hours, large numbers of sperm would die before they could even enter the vagina.

Evidence for the temperature effect includes the fact that semen quality is lower in the warm summer months compared with the cold winter months. The semen volume does not change significantly, but the total sperm count falls in the summer compared to winter, especially in the northern hemisphere during the hottest summer months of July and August.¹⁵

Several protection designs

Several designs reduce the likelihood of testicular injury, including the left testicle usually hanging lower than the right one and, as a result, pressure causes one to slip past the other without pain or injury. Each testicle is housed in a strong fibrous outer

covering called the tunica albuginea, and an effective lubrication system allows the slippage to occur without pain or problems. Injury is rare, and the main source of injury is in sports, which is why it is recommended that sport participants always use protective equipment, such as a jockstrap or hard cup, while playing.

Cryptorchidism

Another reason for the existing placement of the human male reproductive system outside of the body is that the

“... postpartum testicle is designed to function at this lower temperature. Failure of the testicles to descend into the scrotum, called cryptorchidism, causes an increased risk of malignancy and other major health problems. The process of testicle descent is also both complex and poorly understood.”¹⁶

Failure of the testicles to descend following birth leads to progressive abnormality in both the biochemistry and physiology of the testis, often causing infertility.¹⁷

One example is that the abnormal biochemistry caused by descent failure interferes with many of the necessary reproductive system developments. Examples including the transformation of neonatal gonocytes into type A spermatogenesis, a step required to produce viable sperm.¹⁸ This is one reason why failure of the testicles to descend is a major reason for male infertility.

Evolution of the scrotum?

How the many complex male temperature regulative system parts could have evolved can only be speculated, and not be based on observation and science.¹⁹ Consequently, evolutionists must produce many just-so stories in an attempt to explain their existence and function.²⁰ In short, a literature review found that “all of the current

hypotheses regarding the origin and evolution of the scrotum” and external testicles are seriously problematic. Reasons include, assuming external testicle evolution from lower life forms with internal reproductive organs is problematic because it is “why the scrotum has been lost in so many groups, that should be explained”.²¹ The authors even speculate that the scrotum may have evolved before mammals did

“... in concert with the evolution of endothermy in the mammalian lineage, and that the scrotum has been lost in many groups because descent in many respects is a costly process that will be lost in mammal lineages as soon as an alternative solution to the problem of the temperature sensitivity of spermatogenesis is available.”²²

Conclusions

In conclusion, clear evidence exists that year-round reproductive cycles, plus the requirement that human sperm must be kept close to a constant temperature of 4°C below that of the core body temperature, effectively explains the existing design of testicles. Men who have uncorrected non-descended testicles are usually infertile and prone to many other health problems, including cancer. In short, the existing complex design is required for many reasons, including fertility and health reasons. It is, therefore, clear that Hafer’s poor design claim, along with those of other evolutionists, is grossly irresponsible.

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Are all fossil stromatolites biological?

Michael J. Oard

From a creation science perspective there are still many details of the rock and fossil record to work out. One such issue is the origin of fossil stromatolites. A stromatolite is defined as:

“An organosedimentary structure produced by sediment trapping, binding, and/or precipitation as a result of the growth and metabolic activity of micro-organisms, principally cyanophytes (blue-green algae)”.¹

Notice in this definition that stromatolites are assumed to be biological. This is a good definition for living stromatolites that are currently found in restricted marine basins, alkaline lakes, and hot springs. However, it may not be such a good definition for fossil stromatolites. Definitions should be descriptive, not interpretive. Whether all fossil stromatolites are a result of biological processes or not is still unresolved.

The stromatolites in the sedimentary rocks typically look like a stack of upside down bowls. They are common in Precambrian carbonate rocks, but are also found in many younger sedimentary layers. Secular scientists believe it takes hundreds to thousands of years for stromatolites to form.

Huge stromatolites in the Green River Formation

Just recently, the largest identified fossil stromatolites ever found were described from the Green River Formation, believed to be the deposits of an early Cenozoic lake.^{2,3} The stromatolites are 5.5 m tall and 7 m in diameter.

They differ from modern stromatolites in a few significant ways, which has caused some researchers to wonder whether at least some stromatolites are truly biological.⁴ First, they apparently grew around tree stumps, making them similar to those from Lulworth Cove along the south-central coast of England (figure 1). This similarity is strongly suggested by the fact the fossil stromatolites encircle a round



Figure 1. A claimed stromatolite around an eroded upright log at the ‘fossil forest’ at Lulworth Cove, southern England

hole where patchy silicified wood was discovered. The researchers suggest that a lake transgressed a forest, the trees died, and the stromatolites formed around the stumps. Second, algae are supposed to bind particles to form layers that are only millimetres thick, but the layers within the Green River Formation stromatolites are a few centimetres thick. Commenting on the research, Frantz states:

“Undoubtedly, some stromatolites form this way [by binding sediments in microbial mats], but analogous structures can form abiotically (Grotzinger and Knoll, 1999), and distinguishing biogenic from abiogenic structures is not straightforward. ... the colonizing community (if indeed they are biogenic) covered the entire stump.”⁵

Awramik and Buckheim seem to think they were biological stromatolites simply because they are laminated:

“The large, multi-meter-size columns are by far the most unusual stromatolites. They are ‘true’ stromatolites, i.e., they are laminated.”⁶

Just because a sediment is laminated does not necessarily mean that it is a stromatolite, since features similar to stromatolites can be produced abiotically (see below).

Are biological fossil stromatolites a problem for creation science?

The unusually large size of the Green River Formation fossil ‘stromatolites’ calls into question whether they are biological in origin. If they were of biological origin, it seems like it would require more time than is available in the biblical timescale. Snelling and Purdom tend to believe that fossil stromatolites are indeed biological.⁷ They focused on the two most studied areas for modern day stromatolites—Exuma Cays of the Bahamas and Shark Bay in Australia—and compared the modern

stromatolites with those in the rock record.

However, if all fossil stromatolites are biological, they present two major problems for the biblical timescale. First, it would take much more time for biological stromatolites to form than the one-year Flood. There are abundant stromatolites in Paleozoic and Mesozoic rocks that practically all creation scientists attribute to the Flood.⁸

Second, it is difficult to attribute Precambrian stromatolites to the time between Creation Week and the Flood, as Humphreys is forced to do.⁹ Between the Creation Week and the Flood, these sediments would likely have only been able to form under geological conditions similar to (or even quieter than) today. However, such conditions simply do not allow enough time in the 1,700 years that allowed for the formation and fossilization of numerous bands of stromatolites in Precambrian sedimentary rocks, some of which are thousands of metres thick. For instance, the Precambrian Belt Supergroup that contains layers of stromatolites is over 20 km thick.¹⁰

Third, placing Precambrian biological stromatolites in Creation Week, as Snelling¹¹ does, is also problematic. The stromatolites would not only have had to have been created *de novo*, but also buried and fossilized within thick Precambrian sediments.

Reasons why stromatolites in the rocks are not biological

Oard and Froede gave nine reasons why stromatolites in the rocks may not be biological.⁸ Four of them are especially significant. First, it is unlikely that there was enough time during the Flood to produce true stromatolites, nor enough time during Creation Week, unless they were created *de novo*. Most creation scientists believe the Phanerozoic is from the Flood,

except for the continuing debate over the Cenozoic. Stromatolites are not rare in Phanerozoic rocks.^{12–15} Thus, it appears an abiotic mechanism is required for the formation of most, if not all, Phanerozoic stromatolites. It is unlikely pre-Flood stromatolites could be transported into Flood sediments because of the chaos of the early Flood. Moreover, if the stromatolites were transported and not totally destroyed, we would expect the pre-Flood stromatolites to have been broken in pieces and orientated differently from living stromatolites. This all suggests that some Precambrian stromatolites are also a result of abiotic processes.

Second, some stromatolites in the sedimentary rocks are unlike the modern stromatolites from the Bahamas and Western Australia. Stromatolites from the Bahamas and Western Australia are isolated mounds, whereas the stromatolites found in the rocks are generally *continuous* layers of fine-grained laminations with bulbous shapes. Riding states:

“If this is correct, the question arises whether and where modern analogues for Precambrian stromatolites actually exist.”¹⁶

The differences between fossil stromatolites and modern living stromatolites suggest at least some fossil stromatolites are not biological.

Third, there is very little organic matter or organic structures found in fossil stromatolites.^{4,15} The microorganisms that are rarely found could be simply the result of chance, since many Precambrian rocks contain microorganisms.

Fourth, practically all fossil stromatolites are found in carbonates.¹⁷ Modern stromatolites bind all types of sediments, not just carbonates. Moreover, the grains bound by modern stromatolites are sand-sized, while the carbonate in fossil stromatolites is a fine-grained micrite.⁵ The fine-grained micrite suggests an abiotic mechanism during carbonate deposition.

Green River Formation very likely from the Flood

However, the discovery of what is claimed to be giant stromatolites in the Green River Formation creates a paradox. Some creation scientists believe the Green River Formation formed as a post-Flood lake.^{18,19} In contrast, there is ample evidence to suggest that the Green River Formation is a Flood sedimentary rock.²⁰ This would support the deduction that these stromatolites are not biological because they would not have time to grow as large in the one-year Flood. This may also explain the unusual size and thickness of these stromatolite-looking features.

Conclusion

Fossil ‘stromatolites’ are enigmatic structures. Nonetheless, interpreting them all as biological in origin creates numerous difficulties for the biblical timescale, whether stromatolites are placed in the Flood, Creation Week, or between Creation Week and the Flood. This suggests at least some fossil stromatolites formed by abiotic mechanisms, as some secular scientists also claim for some fossil stromatolites. More work is needed to properly elucidate the origin and geological significance of these structures.

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Floating forest hypothesis fails to explain later and larger coal beds

Timothy L. Clarey

Recently, there have been two papers that have been critical of the floating forest hypothesis. The first paper demonstrated that there are several geological problems that cannot be resolved with a pre-Flood floating forest biome.¹ Some of these problems included:

1. the lack of hydrological support for a sustainable fresh water lens capable of supporting the biome
2. the lack of a viable explanation for the timing of the lycopod coal beds, as most occur only in upper Carboniferous layers
3. the lack of a reasonable model to explain the deposition of three complete megasequence cycles in North America prior to the beaching of the claimed floating forests, and
4. the lack of any evidence of a floating forest biome in rocks deposited during the closing of the proto-Atlantic Ocean, which was presumably consumed during the formation of Pangaea.¹

The second paper identified an *in situ* site in Scotland that demonstrated pre-Flood lycopod trees were rooted in soil and not floating atop the ocean.² The Glasgow site contains 10 lycopod stump casts that are all rooted in the same horizon and are equidistantly spaced in growth position. Each of the lycopod trunks exhibits a common southwesterly direction of deformation, identical to the paleocurrent direction of the ripples in the encasing sandstone. However, the lycopod tree roots do not show this directional deformation. The

roots also visibly penetrate downward into the mudstone below.³ These two observations indicate that the roots must have been embedded in the underlying horizon prior to the deformation of the trunks.² In addition, this paper demonstrated that living lycopod trees were not as hollow as many have claimed.² This paper concluded by suggesting we drop the floating forest hypothesis altogether.

Lycopod fossils uncommon in Cretaceous and Paleogene coal seams

Most Flood geologists are in favour of an allochthonous origin for coal, resulting from transport of vegetation by the high energy of the Flood. Creation scientists point to the tree mat that formed on Spirit Lake from the eruption of Mt St Helens in 1980 as verification of this process. Allochthonous coal is not the issue that is being criticized. The aforementioned papers only question the viability of a pre-Flood floating forest biome, and question the presumption that this environment covered much of the pre-Flood ocean surface. As these papers demonstrated, there is clearly insufficient evidence to support this hypothesis.^{1,2} Unfortunately, this issue is sometimes ‘muddled’ in creationist literature because the term ‘allochthonous coal’ is sometimes used interchangeably with the floating forest hypothesis.⁴ However, these terms are not by any means synonymous. Indeed, the origin of Flood-transported vegetation, similar to the allochthonous log mat observed at Spirit Lake, is not the same as the pre-Flood floating forest biome.⁵

There is another, often overlooked, issue where the floating forest hypothesis fails to provide adequate explanation. Lycopod-rich coal beds are confined

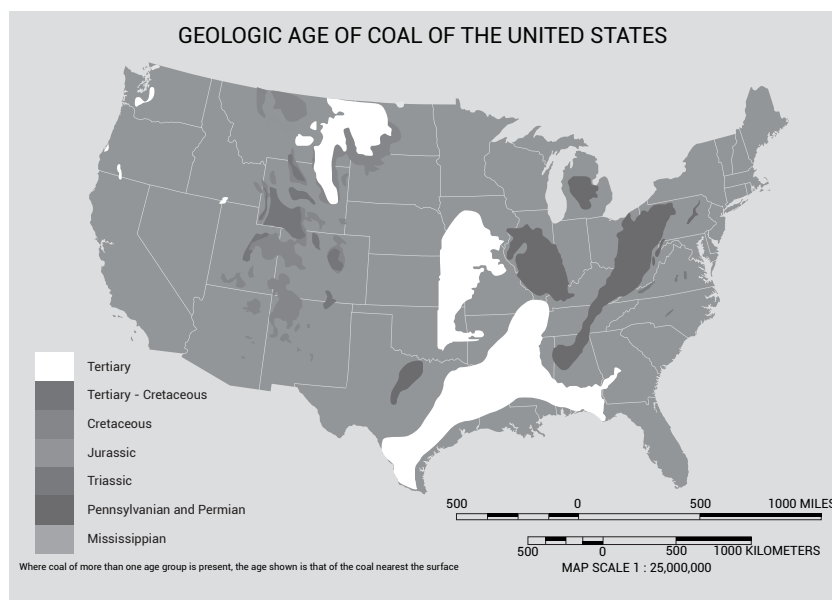


Figure 1. Map of the coal beds in the USA by age. Note the coals in the Western USA are primarily found within Cretaceous and Paleogene Tertiary rocks. The Pennsylvanian (upper Carboniferous) coals in Eastern USA are thin and discontinuous. The map merely outlines the extent of all coal beds, not individual beds. (After USGS map¹⁶)

primarily to upper Carboniferous rock layers.¹ Coal deposits found in later Flood rocks show steadily decreasing numbers of lycopod trees and more and more conifers and even many angiosperms. In fact, the thickest and most extensive coals in the USA are from Cretaceous and Paleogene rock layers and are almost exclusively composed of conifer-dominant plants, like the metasequoia, and very few if any lycopods.⁶

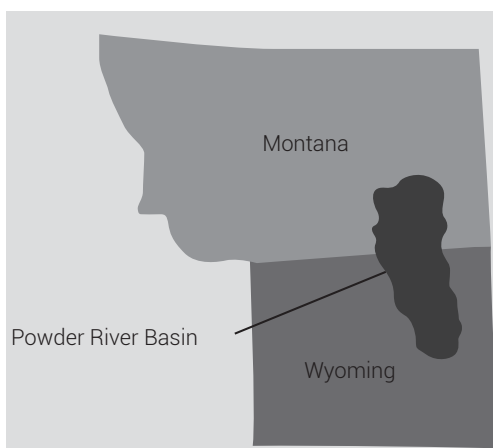


Figure 2. Map showing the outline of the Powder River Basin, Wyoming and Montana, USA (after Luppens *et al*)⁹

Most of the coals in the USA west of Kansas, Nebraska, and South Dakota are found within Cretaceous and/or Paleogene rock layers and contain few, if any, lycopod tree remnants (figure 1).⁷ In contrast, the coal beds in Eastern USA, which are composed primarily of lycopod trees, are found almost exclusively within Carboniferous rock layers (figure 1). These include the Pennsylvanian (upper Carboniferous) coals in Illinois, Michigan, and the Appalachian region. The Carboniferous coal beds in Eastern USA are usually 3.0 m or less in thickness. Whereas, the non-lycopod-rich coal beds in the Colorado Plateau and Northern Rockies usually exceed 3.0 m, especially in the Powder River Basin of Wyoming where beds are often thicker than 15 m over significant areal distances.⁸

Indeed, the Powder River Basin (PRB) coals, which are all within Paleogene system rock layers, contain the largest reserves of low-sulfur subbituminous coal

in the world (figure 2).⁹ Roughly 42% of the present coal production in the USA comes from the Powder River Basin.⁹ At least six or more coal beds in the PRB exceed 30 m in thickness and some individual beds have been shown to extend for over 120 km.¹⁰ Some of these coal beds can exceed 70 m thick in places, such as the Big George coal layer.⁹ The USGS has estimated that the total in-place coal resources of the PRB are approximately 971 billion tonnes, with just ten individual beds making up about 80% of that value.^{9,11} The vast majority of the PRB coals are found in Cenozoic rocks such as the Tongue River Member of the Paleocene Fort Union Formation.^{9,12} These coals contain virtually no lycopod trees and are instead derived from metasequoia trees and other semitropical rooted plants.⁶

The massive extent and volume of Cenozoic coal beds is not exclusive to the USA. Cenozoic coal beds in South America (SA) are also the thickest and most extensive across that continent too.¹³ It is estimated that the Cenozoic coal beds alone make up about one-half of all coal in SA, and the tonnage is estimated to be greater than any other geologic system or combination of systems.¹³

Floating forest hypothesis cannot explain coal

One of the primary purposes of the floating forest hypothesis is to try and explain the coal beds found in Carboniferous rocks globally.^{4,5} However, recent research has demonstrated that the floating forest model fails to explain the origin of these thinner Carboniferous coals.^{1,2} To make matters worse, the advocates of the floating forest hypothesis have made no attempt to account for the thickest and most extensive coals in the world. Coals found in Cretaceous and Paleogene rocks globally have been largely ignored. Creation scientists should not dogmatically hold on to

a hypothesis that cannot adequately explain even the smallest subset of coal deposits,^{1,2} let alone later and thicker coal beds.^{8,10} An acceptable Flood-based coal model should provide an explanation for *all* coals.

New Flood model for coal

Recently, a new model for allochthonous coal formation has begun to be developed.¹ This new model harkens back to, and is not too dissimilar from, the concepts of the early pioneers in creation science.^{14,15} According to this model, forests of lycopod trees apparently fringed the lowest elevation levels of the pre-Flood continent(s).¹ As the water levels rose during the Flood (Genesis 7:17–21), these trees were likely torn loose and deposited *en masse*, becoming coal within the Carboniferous rock layers.¹ A few lycopod forests, like the site in Glasgow, Scotland, were merely sheared off, transporting the tree trunks while leaving the rooted stumps in place.² Later, as the Floodwaters increased in height, trees like the metasequoia that grew at higher elevations were torn loose, transported, and deposited as allochthonous coal beds in the later Flood rocks of the Cretaceous and Paleogene systems. These later deposits became the thick coal beds in the Powder River Basin of Wyoming and Montana, USA.

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'Paleosols' can form faster than secular scientists think

Michael J. Oard

A paleosol is defined as a soil that formed on a landscape in the past that is no longer forming but more often was subsequently buried.¹ Secular scientists believe that it takes tens of thousands to millions of years for some soils to form and be subsequently buried:

"The relatively long duration of pedogenesis (10^4 to $>10^6$ yr) for these paleosols makes them unlikely to have been influenced by short-duration climate fluctuations and allows them to accurately reflect long-term climate trends related to global climate change."²

Paleosols were once thought to be rare but are now said to be quite common in the rocks, even dating back into the Precambrian.³ Retallack provides an example of how common they are thought to be when he claims he found 87 paleosols in a 143 m stratigraphic section of the badlands in South Dakota, USA (figure 1).⁴

'Paleosols' between Columbia River Basalt flows developed much faster than expected

Even if we accept that secular science can accurately measure time, paleosols are known to have formed much faster than commonly assumed. Many interbeds within the Columbia River Basalt (CRB) flows of the north-west USA are considered paleosols, especially if the sediment is red. The CRBs are one of the smallest of a large number of Large Igneous Provinces that outcrop on the continents and the ocean bottoms.⁵ They cover 210,000 km², if the Steens Mountain Basalts of south-east Oregon are included. According to the secular story, lava had covered



Figure 1. Big Badlands National Park overlook showing horizontal, mostly volcanic and poorly lithified sediments

the area within a million years.⁶ The CRBs are an average of 1 km deep with a maximum of about 4 km in central Washington, and consist of about 300 basalt flows, mostly from long N–S vents in south-east Washington and north-east Oregon.

The ‘paleosols’ found between the flows are assumed to have taken tens of thousands to millions of years to form (see quote above²). The properties of the paleosols led the researchers to believe the well-developed soils are a result of a warm, wet climate, like Hawaii but with less rain.⁷ This is inferred from kaolinite clay and laterites, a high iron soil usually found in the tropics. A slightly cooler climate then set in about 15.8 Ma ago during the period of eruption. It is believed this climate change was caused by the beginning of water exchange between the Atlantic and Arctic Oceans through the Fram Strait between northern Greenland and Svalbard. However, this does not seem to be a significant enough factor for climatic cooling.

Needless to say, there is a problematic contradiction between the age of basalt flows and the age of the inter-bedded paleosols:

“At least 50% of the Grand Ronde Formation (the R₂ and N₂ units) was erupted over a period of not more than 0.30 m.y. (Baksi, 1989), and some evidence suggests that all Grand Ronde lavas were erupted in just 0.42 ... m.y. (Barry *et al.*, 2010). Both of these proposed eruptive durations present interesting problems for the correlation between eruption timing and pedogenesis, because many paleosols within these units are interpreted to represent hundreds of thousands of years of landscape quiescence during which pedogenesis occurred.”⁸

The Grand Ronde Basalts are 90% of the CRBs. The researchers do not resolve the conflict. They were more interested in showing a climate shift

at 15.8 Ma from the ‘Miocene climate optimum’.

Creation science implications

This research shows that the geological situation, multiple lava flows, can contradict a claim of old age, such as the time deduced for soil and paleosol development by uniformitarian scientists. It is also interesting that within the kaolinite paleosols between lava flows is unaltered feldspar, which weathers quickly and thus provides contradictory data for the uniformitarian claim of paleosols between lava flows.

Paleosols bring up a question for creation scientists. How would we explain them? Without doubt creation scientists need to analyze paleosols in more depth, but are the paleosols really buried soils? The evidence for paleosols is equivocal.⁹ All soils have soil horizons, but with few exceptions paleosols lack a top organic horizon, one of the best indications of a buried soil. The claimed paleosol is most often only a clay layer, carbonate layer, a ‘weathered layer’, or a mudstone, which can easily be a depositional layer or a layer altered by diagenetic or hydrothermal reactions. Ollier and Pain admit:

“Rising water, steam and other emanations from deep in the earth move upwards through enclosing country rock and bring about some alteration. This may include ... the formation of clays. This is not [surficial] weathering, but hydrothermally altered rocks may come to look very like weathered rocks ...”¹⁰

During the Flood, we would expect rocks to have the appearance of weathering since rapid sedimentation and fluid flow would be common. These fluids would easily modify or react with sediment giving it the appearance of a buried soil.

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A climate of ignorance and lies

A Climate of Hope: Church and mission in a warming world

Claire Dawson and Mick Pope

Urban Neighbours Of Hope, Victoria, Australia, 2014

Andrew S. Kulikovsky

Claire Dawson studied commerce and holds a M.Div. from Melbourne School of Theology. Mick Pope has studied theology and holds a Ph.D. in meteorology from Monash University. In this book they seek to advance a Christian call-to-action on ‘creation-care’ with a special focus on the Christian response to ‘climate change’.

They begin their study by positing that the best way to love your neighbour is to love the earth you share with your neighbour. They also believe there is a solid theology of ecology at the heart of biblical faith because “Genesis 1 describes *what* creation is for, rather than precisely *how* it was made” (p. 28). But such a reductionistic view simply does not align with what Genesis 1–2 actually states. God’s creative activity is precisely described using the verbs ‘created’, ‘made’, ‘said’, ‘called’, ‘set’, ‘formed’, ‘caused’, ‘took’, ‘planted’, and ‘blessed’. Furthermore, these activities are described from start to finish, and spread out over a period of six days. In other words, the Genesis account describes exactly how God created, the order in which He created, and the timing of His creative acts.

The authors go on to examine our relationship to the earth and environment as God’s stewards, created in His image.

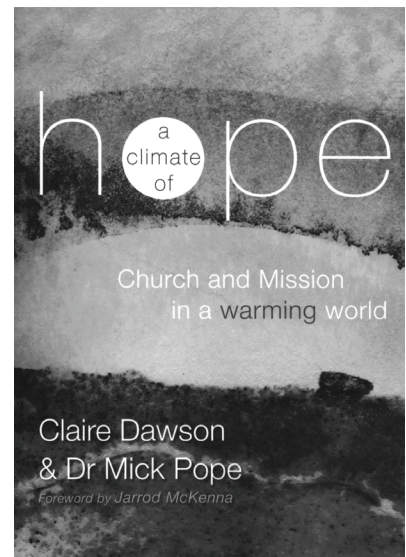
Sin, idolatry, judgment, and ‘climate change’

One may reasonably ask what all this has to do with the Christian church and its mission? Jesus gave us a great commission to make disciples (Matthew 28) not to become environmentalists. Dawson and Pope respond by claiming “our original mission was to represent God to the cosmos and to undertake the wise rule of the Earth” (p. 41). But this was God’s *purpose* in creating human beings. Our mission is indeed the Great Commission: to bring the gospel of Jesus Christ to all the nations and to make them disciples.

The authors claim that human beings are changing the climate because of their burning of fossil fuels, and this is “consistent with a biblical doctrine of human sinfulness” (p. 67). Dawson and Pope believe ‘climate change’ and its effects are the result of God’s judgment, and accuse Christians of idolatry for “worshipping created things rather than the Creator” (p. 37). Yet this criticism is far more applicable to environmentalists—Gaia has become their God and they worship nature. The environment has become holy and sacred—at the expense of human well-being.

In any case, the authors make the following six sweeping and grossly presumptuous assertions (p. 165):

- We have been unfaithful to our God as stewards and caretakers of his good creation;
- We have failed in our proclamation of the Gospel to present a message of reconciliation that includes the mending of our broken relationship with creation;
- We have damaged our witness to those earnestly searching for a hope-filled faith that cares deeply for the natural world;



- We have accommodated almost completely the secular materialism of our era, including the idolatry of rampant consumerism;
- We have rarely presented a holistic and hopeful Gospel that fully captures people’s affections of imagination; and
- Through wilful ignorance and inaction, we have been neglectful in our love of our neighbour, particularly of those who will bear the brunt of the disrupted climate: the world’s most poor and future generations.

Economic ignorance

For the authors, the idolatry usually takes the form of unbridled economic growth that damages both the environment and humans. “The West has benefited from over a century and a half of fossil fuel burning and the use of the developing world as sources of cheap resources, cheap labour and lax environmental codes.” For the authors, this equates to “unrighteousness, wickedness, greed, evil ...” (pp. 37–38).

However, economic growth has not run up against natural limits and nor is it likely to do so. History shows that—despite the claims of doomsayers like Paul Ehrlich—natural resources have

become more abundant and cheaper despite rapid population growth.

The authors go on to accuse everyone in the West of viewing our economic system as our ‘God’ and ‘Saviour’ and that this is the ultimate cause of climate change. But the authors’ total ignorance of basic economic processes is breathtaking. The market is not a mysterious, impersonal force or entity—it is the sum of all human beings who wish to exchange goods and services. The market does not choose what is best; the people participating in that market choose what is best—for them! And to suggest that everyone who participates in the market has effectively elevated it to God-like status is slander. Moreover, things are only worth what people are prepared to pay for them. Except for human beings, made in God’s image, nothing has ‘inherent worth’, but no Western capitalist economic system buys and sells human beings!

Like many environmentalists, the authors are inclined to Marxist ideas such as defining justice as the “fair redistribution of wealth” (p. 53), but like most Marxists and ‘social justice’ warriors, they fail to understand that wealth is *created* not distributed!

Dawson and Pope apparently agree with Tom Sine: “while some might claim that it is this expansionist market model that will bring billions of people out of poverty, he makes it very clear that the underlying aspirations and values reflect those of *modern culture*, and that they are in many ways in direct conflict with those of the foundation of a *biblical faith*” (p. 129). However, “this expansionist market model” has indeed brought a billion people out of poverty.¹ Would Dawson and Pope (and Sine) prefer that they were still poor? In any case, the notion that free-market capitalism is in direct conflict to biblical faith is a mere assertion, for which they offer no support. In fact, Rodney Stark has shown that modern capitalism was a product of Christianity.²

Earth's capacity and resources

Although Genesis 1:26–28 records God telling Adam and Eve to be fruitful, increase in number, fill the earth and subdue it, and to rule over all living creatures, Dawson and Pope argue that this was a unique situation when the earth is empty of humans. However, they suggest the earth is already full. But this claim is nonsense. Assuming a population density similar to New York City, the earth’s entire present population of seven billion could fit into the state of Texas. At a density similar to London, everyone could fit into the states of Texas, New Mexico, Oklahoma, Arkansas, and Louisiana.³ It should be clear, then, that whatever the maximum sustainable population is, we are presently nowhere near it.

Dawson and Pope also claim the statement about fruitfulness and multiplying is part of a blessing and is not a command as such. However, this argument is not supported by the Hebrew grammar. The verb וַיְבָרֶךְ (*wāyḇārēk*, ‘to bless’) has the Piel stem. When God is the subject of this verb, it indicates that the object has been given a special power and/or authority.⁴ In this case, the power and authority to fill and subdue the earth and to rule over the animal kingdom. In addition, both פְּרֹוּ (*p’rû*, “be fruitful”) and רבוּ (*rḇû*, “become many”) are Qal imperatives indicating commands.

The authors also assert that because the carbon emissions per capita of Western nations like Australia and the USA are much greater than developing nations, they are mostly to blame for climate change and must bear the burden of making the largest reductions. However, per capita emissions are simply a reflection of the collective wealth and standard of living of a given nation. Large per capita emissions do not necessarily indicate a large amount of actual emissions. A small island hosting a few people who rely on diesel-powered generators running 24 hours a day would have

extremely large per capita emissions but miniscule actual emissions.

Dawson and Pope regard the idea of pursuing infinite growth on a finite planet as “highly illogical, irrational, and fundamentally unsustainable” (p. 129). And once again, they reveal their total ignorance of economics and natural resources. Regarding natural resources, the entire earth is made of them! All chemical elements that constitute the planet are, or have the potential to be, natural resources. The issue is merely one of usability, accessibility, and economy: knowing how different elements and combinations of elements may be used, and being able to collect them and apply them in particular useful applications without having to expend an inordinate amount of labour to do so.

Nor is there any real scarcity of energy in the world. Indeed, energy is never actually used up. The Law of Conservation of Energy states that energy can neither be created nor destroyed. Rather, it is simply transformed into another form. The issue then becomes a question of the cost of transforming energy into a useable form.

In any case, the issue with natural resources is not one of intrinsic scarcity. The natural resources available amount to the total matter and energy on Earth and, indeed, in the entire universe. Although this supply is technically finite, for all practical purposes it is infinite.

The ultimate key to the economic availability of energy and natural resources is motivated human intelligence, which implies a capitalist society. However, Dawson and Pope disregard the role of human intelligence in the production of economically usable natural resources. They naïvely believe that every act that consumes natural resources is an act of destruction of precious resources that can never be replaced, and therefore condemns future generations to impoverishment. But history shows how wrong they are.⁵

Impact on the environment and the poor

Dawson and Pope make a number of assertions about the impact of climate change on the environment. For example, they note that “a number of rivers in the USA no longer reach the sea (e.g. the Colorado River) and nature and irrigation compete for water in the Murray Darling basin of eastern Australia” (p. 33). But these are water management issues that have nothing to do with climate. In China, “[t]he air is so polluted from the burning of fossil fuels that many of its citizens are finding it hard to breathe” (p. 151). Again, this has nothing to do with carbon dioxide and everything to do with particulate carbon. In any case, China is a Communist government-controlled society not a free capitalist one.

The authors express concern and fear for the poor and assert that “people are suffering from climate change right now, especially those in developing nations” (p. 54). Citing the parable of the Good Samaritan, they argue that these people are our neighbours and we have a moral imperative to help fix the climate problem. Ironically, they acknowledge that developing nations’ problems lie in their limited economy and lack of infrastructure. Yet access to cheap reliable energy—produced from fossil fuels—is required to fix this problem. Indeed, Indian Prime Minister Narendra Modi stated that the Indian government has said it needs to emit more to industrialize and lift millions out of poverty.⁶ Yet climate change activists and alarmists (including Dawson and Pope) want to prevent this from happening. It is they who are keeping the poor in their poverty!

Dawson and Pope assert that climate change will result in many deaths, droughts, declining crop yields, and other climate-related disasters, but their claims do not match reality. Carbon dioxide—the alleged driver of man-made global warming—is plant food and greater atmospheric carbon

dioxide means greater plant growth. A study has shown that increasing CO₂ emissions during the 20th century has resulted in a large historical growth in global primary production.⁷ Indeed, world crop production has increased and broken records in recent years.⁸

Regarding extreme weather events, tropical cyclone activity in Australia is at a historic low—lower than any time over the past 550 to 1,500 years.⁹

Furthermore, there are frequent references to the effects of sea-level rise on island nations such as Tuvalu and Kiribati, but once again their facts are wrong. A recent study of 27 Pacific islands found that just four had diminished in size. The remaining 23 had either stayed the same or grown larger.¹⁰

Speaking of Kiribati, Dawson and Pope also claim that rising sea levels have caused a loss of fresh water due to salt water intrusion. However, this is a distortion of the truth as the real problem is over-population given the limited capacity of these islands. The residents “are currently drawing on a groundwater supply that can only support half the population”.¹¹

The authors’ ignorance is once again displayed when they assert that climate change is responsible for spreading malaria to “new parts of the world” (pp. 56–57), including the Kenyan highlands where the disease had not occurred before. But malaria is not an exclusively tropical disease and its spread involves factors other than warm weather. The disease occurred all over Europe in the last few centuries, with the largest and deadliest outbreak (around 10,000 deaths) occurring in the Siberian port of Archangel in 1922–1923.¹² Moreover, malaria outbreaks have occurred in the Kenyan highlands in 1918–1919 and six times between the world wars, and continued to be a problem until the 1950s, but have become a problem again since the 1970s. The fact that numerous epidemics have occurred before the advent of global warming and at higher altitudes demonstrates that climate

change is not a factor in the disease’s resurgence.¹³

The false assertions continue when the authors attempt to link the 70,000 related deaths during the 2003 European heatwave and the 988 related deaths during the 2009 Australian heatwave. That the number of heat-related deaths in Europe were several orders of magnitude greater than those in the much hotter Australian climate should have prompted Dawson and Pope to recognise that the problem is that European houses are simply not built for hot weather nor are many equipped with air-conditioning systems. In any case, cold weather is the biggest killer around the world. An extensive multi-country study found that significantly “more temperature-attributable deaths were caused by cold ... than by heat ...”.¹⁴

The authors reject the notion that caring for the environment comes at a cost of caring for people. For them, “caring for the environment also means caring for the people who live in that environment” (p. 43). As Jarrod McKenna put it: “To care about the poor is to care about climate change” (p. 169).

While it is a fair point to argue that environmental damage hurts the poor, it is premised on whether ‘climate change’ is as destructive as climate alarmists claim. As the discussion above shows, this is not the case. In fact, there are numerous benefits from global warming, including “fewer winter deaths; lower energy costs; better agricultural yields; probably fewer droughts; maybe richer biodiversity”.¹⁵

Climate science

The moral argument that Dawson and Pope make relies on the reality of impending doom through dangerous man-made climate change. The authors are convinced that the scientific basis for catastrophic anthropogenic climate change is correct and the evidence is overwhelming. To disagree is to be a ‘denialist’. “Real science uses

scepticism; denial ignores the facts” (p. 71). But what if they are wrong and the scientific basis is dubious?

Dawson and Pope acknowledge that science involves working hypotheses that are believed to explain actual observations and make useful predictions. A scientific hypothesis is “a work in progress; best explanation; open to revision; approximation to the truth” (p. 72). Similarly, scientific models are approximations.

The Intergovernmental Panel on Climate Change

Nevertheless, they claim the IPCC uses a ponderous but careful process of going over the peer-reviewed literature by experts in the field. Their report “certainly isn’t some half-cocked, shoot from the hip statement. It isn’t a collection of sound bites, and it isn’t funded by special interest groups” (pp. 72–73). They think people should be surprised at how few errors have been found in their work. Moreover, the authors also believe there is a “systematic tendency to understatement”. In the case of published climate change research, ‘scholarly reticence’ is common (p. 73). However, their reverence for scientists and the IPCC is misplaced.

Many IPCC contributors—and, indeed, lead authors—are *not* top scientists, and many have close ties to activist organisations including Greenpeace, the World Wildlife Fund and the Environmental Defence Fund.¹⁶

In fact, an audit of the IPCC’s 2007 climate bible revealed that 30% of its 18,531 references were to non-peer-reviewed sources, including newspaper and magazine articles, unpublished masters and doctoral theses, and Greenpeace and World Wildlife Fund brochures, and press releases.¹⁷

IPCC insiders have noted:

“There are far too many politically correct appointments, so that developing country scientists are appointed who have insufficient scientific competence to do anything

useful We had half of the [lead authors] who were not competent.”

Another insider commented:

“The whole process . . . [is] flawed by an excessive concern for geographical balance. All decisions are political before being scientific.”¹⁸

Despite public perceptions and claims to the contrary, IPCC procedures and processes are not transparent.¹⁹ The IPCC takes research findings at face value and does not verify that the raw data actually supports the researcher’s claims. IPCC insiders have pointed out that quality assurance and error identification are non-existent. One could argue that this is the job of the peer-reviewed journals in which the research was originally published, but peer review does not guarantee the correctness or truth of the research.²⁰ Moreover, reviewers rarely, if ever, get access to the raw data and computer code and algorithms used to process the data. This is like asking an auditor to approve a company’s financial statements purely by examining the annual report.²¹

The IPCC does not always reflect the latest and best research. IPCC expert reviewers Nic Lewis and Marcel Crok point out that the best observational evidence indicates our climate is considerably less sensitive to greenhouse gases than climate scientists had previously thought. Although the relevant scientific papers are all mentioned in the full 5th IPCC Report (2014), this important conclusion is never drawn (it is only mentioned as a possibility), and it is totally missing from the *Summary for Policymakers*. Yet the *Summary for Policymakers* presented the ‘likely’ range for climate sensitivity as 1.5–4.5°C and did not provide a best estimate, despite the fact that the latest research indicates an observationally based ‘likely’ range of 1.25–3.0°C, with a best estimate of 1.75°C, a significant reduction from the previous best estimate of 3°C. This is a dramatic finding yet it was not reported by the IPCC.²²

Sea-level specialist Nils-Axel Mörner told a House of Lords committee that, between 1999 and 2003, genuine sea-level experts held five international conferences to discuss the available evidence. They concluded that sea levels are unlikely to increase by more than 10 cm by the year 2100. According to Mörner, the claims are that sea levels are rising quickly—or that entire island nations are in imminent danger of drowning—are simply not true.²³ Yet these experts were ignored by the IPCC.

Climate models

The catastrophic predictions of climate scientists obviously do not come from direct observation, but from computer models. But the problem with computer models, as Freeman Dyson pointed out, is:

“They do not begin to describe the real world that we live in. The real world is muddy and messy and full of things that we do not yet understand. It is much easier for a scientist to sit in an air-conditioned building and run computer models, than to put on winter clothes and measure what is really happening outside in the swamps and the clouds. That is why the climate model experts end up believing their own models.”²⁴

IPCC lead author John Christy noted, “the truth, and this is frustrating for policy-makers, is that scientists’ ignorance of the climate system is enormous”.²⁵ Thus, not surprisingly, the climate models do not correspond to actual observations as shown in figure 1.

Over 95% of the models significantly overestimate the amount of warming. Christy remarked:

“... it is disturbing that ‘consensus science’ will not acknowledge that such discrepancies are major problems. From the Intergovernmental Panel on Climate Change’s beginning, that largely self-selected panel of scientists has embraced the notion that consensus on climate change is the necessary path to

taking action and reducing man-made carbon emissions around the world. The consensus community uses this to push the view that ‘the science is settled’ and hold up skeptics to ridicule ...”²⁷

Indeed, if climate models cannot be verified against actual observations and consistently overestimate warming, why should we accept their predictions for the future? In any other field of science these models would be discarded as ‘junk’.

Climate scientists behaving badly

Many climate scientists have been exposed as having acted dishonestly at worst and unprofessionally at best. The ‘Climategate’ emails have revealed that leading climate scientists—including and especially, Michael Mann, who Dawson and Pope endorse and defend—have:²⁸

1. Manipulated and ‘selected’ data to ensure it supports their conclusions;
2. Manipulated or discarded data that did not support their conclusions;
3. Conspired to hide the existence of the Medieval Warm Period;
4. Conspired to destroy journals and editors that published sceptical papers;
5. Conspired [successfully] to oust James Saiers, editor of *Geophysical Research Letters*, for publishing a paper by sceptic Steve McIntyre;
6. Refused to comply with Freedom of Information (FOI) requests;
7. Conspired with other parties to find excuses not to comply with FOI requests;
8. Conspired to delete any information subject to FOI requests rather than hand it over;
9. Refused to release IPCC review comments;
10. Refused to publish in journals that require making data available;
11. Pressured media outlets not to publish sceptical articles.
12. Expressed the desire to have a veto of what climate research gets

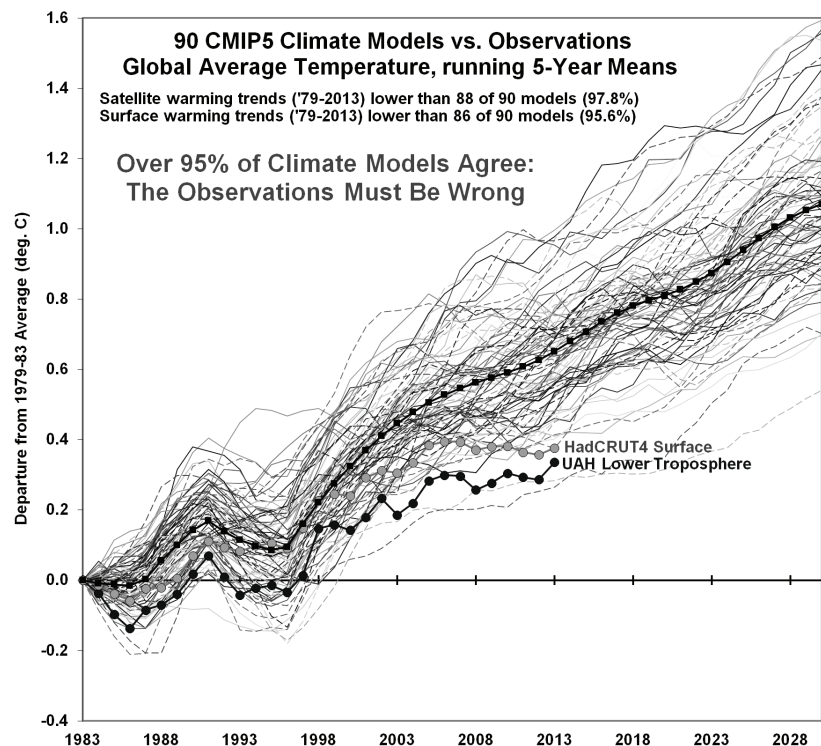


Figure 1. Climate models vs actual observations (from Roy Spencer²⁶)

published (i.e. only research that supports their own!);

13. Conspired to ensure certain sceptical papers will not be included in the IPCC report; and
14. Allowed their personal views to trump science.

Yet, Dawson and Pope do not acknowledge or even mention the ‘Climategate’ emails!

The authors state that Michael Mann, the author of the ‘hockey stick’ graph generated from tree-ring proxy data, “became the target of much vitriol, both scientifically and personally” (p. 82), suggesting that the criticisms were nasty and unjustified. This is misleading. McIntyre and McKittrick have shown that Mann and colleagues used a flawed methodology and statistical analysis.²⁹ Indeed, Mann’s data processing usually produced a ‘hockey stick’ graph regardless of what data was fed in! Even warmist climate scientist Tom Wigley admitted that Mann’s hockey stick paper is “a very sloppy piece of work”.³⁰ Nevertheless, the authors

add: “Several reviews of his work have been conducted, with different datasets using different types of data such as coral cores, boreholes and glacier records. They all found his hypothesis to be essentially correct” (p. 82). However, this is a blatant lie! Dawson and Pope cite Figure 5.7 from IPCC Assessment Report 5 (AR5) to support their claim. Figure 2 is Mann’s ‘hockey stick’ graph from AR3. Figure 3 is figure 5.7 from AR5.

It should be immediately obvious that the graphs in these two figures are completely different. The most significant difference is that most of the mean temperature anomalies from AD 1400 backwards on the AR5 graph are positive (reflecting the Medieval Warming Period), whereas the temperature anomaly for the corresponding period (back to AD 1000) on Mann’s ‘hockey stick’ is negative, effectively deleting the Medieval Warming Period (AD ~1000–1250). Note also that Mann’s ‘hockey stick’ tree-ring reconstruction was not included in the AR5 graph. Moreover,

Mann's tree-ring reconstruction ended in 1980, even though more data was available, and instrumental data was added for the remaining 20 years. This was because the tree-ring data from 1980 onwards showed a declining temperature trend which diverged from the actual measurements. Therefore, Mann (and subsequently Keith Briffa and Phil Jones) truncated their reconstructions when they began to diverge and substituted actual temperature measurements to 'hide the

decline'. This is because the diverging reconstructions indicate that tree-rings are poor and unreliable thermometers.

Of course, the authors cannot resist referring to Cook *et al.*'s 2003 paper in order to claim that 97% of climate scientists believe in man-made global warming.³¹ Apart from being a logical fallacy—scientific fact is not determined by a vote—this paper has been thoroughly debunked. The published papers analyzed in the study were grossly misrepresented.

The actual 'consensus' is a miniscule 0.3%!³²

Climate data

Dawson and Pope place great confidence in the temperature datasets, pointing out that "four different sets of climate records show that the planet has warmed since the start of the Industrial Revolution" and "the last three decades are the warmest for at least the past 1,400 years" (p. 75). They argue that all the datasets agree and point to the 2010–2012 independent Berkeley Earth study (BEST) that purportedly shows that previous datasets reveal "a dramatically warming world" (p. 78).

However, BEST includes only land stations, and none of the more accurate satellite measurements, and diverges upwardly from them. Moreover, BEST data suffers from the same limitations as the underlying data sets it employs.

Steve McIntyre has pointed out that the underlying datasets include entirely *ad hoc* and counter-intuitive adjustments and the methodologies employed result in the rewriting of history. Many of the rural stations do not adhere to formal standards of station quality, and the various land temperature datasets do not adequately account for the effect of 'urban heat islands' given that most stations are in urban areas.³³ There are also many instances of wildly incorrect temperature and location data.³⁴

The BEST group itself warns:

"... we can't rule out the possibility of large-scale systematic biases. Our reliability adjustment techniques can work well when one or a few records are noticeably inconsistent with their neighbors, but large-scale biases affecting many stations could cause such comparative estimates to fail."³⁵

In any case, the NOAA/NASA 2013 Global Temperatures Report shows that the 'pause' in global surface temperature rises, beginning in 1997, continues. Statistically speaking, there has been no significant upward trend in global temperatures over this period.³⁶

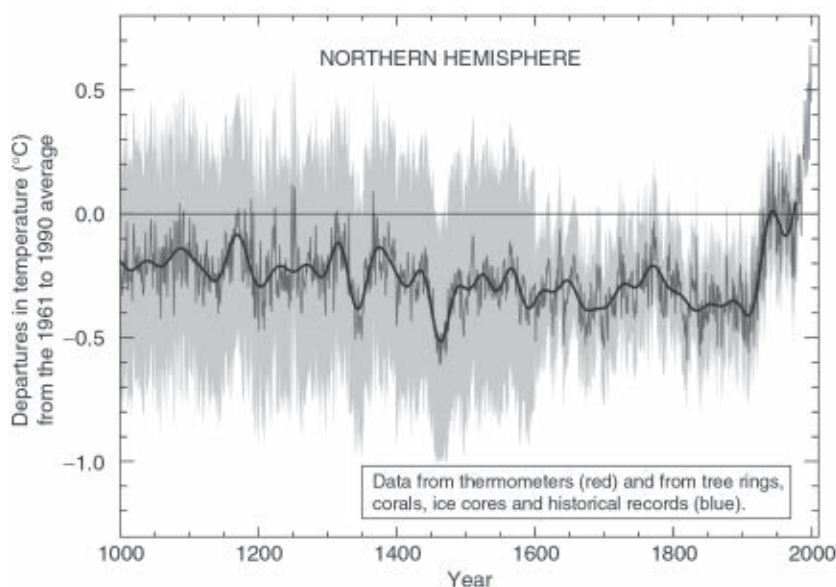


Figure 2. Michael Mann's 'hockey stick' graph from AR3. Note that the grey area of uncertainty is often not included when this graph is cited.

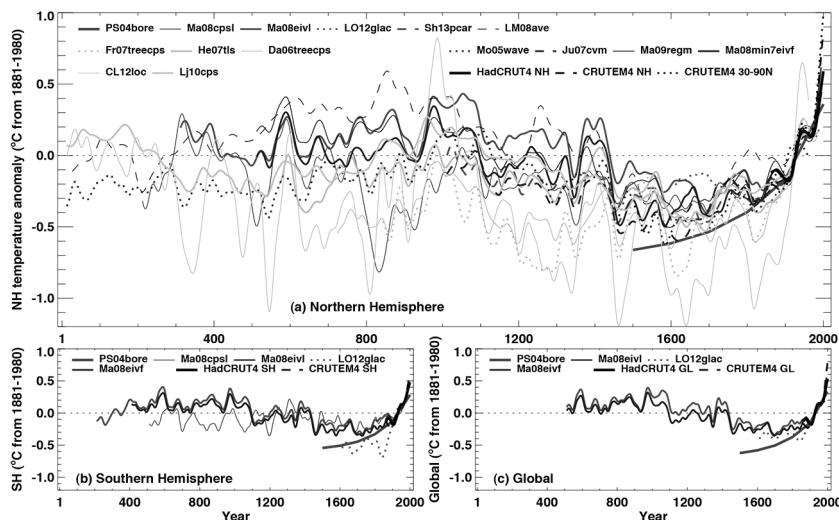


Figure 3. Graph of temperature reconstructions from IPCC AR5 (Fig5-07)

Radical action necessary

Dawson and Pope endorse the view that “there is now no non-radical option available Something must change: will we choose changes to our human systems that have other desirable features, or have involuntary ones imposed on us as the planet changes?” (p. 139). They also support a divestments campaign whereby people and institutions withdraw financial and social support for the fossil fuel industry, and are sympathetic to those who have demonstrated a willingness to risk jail time for their commitment to the cause.

Because large-scale commercial food production is fossil fuel-intensive, involving machinery, pesticides, fertilisers, and transportation, the authors also suggest we adopt ‘self-sufficient living’ where we all ‘grow our own food’ instead of depending upon “a food production system run by multinational agri-businesses” (p. 127). They go even further by advocating “a widescale transition toward vegan diets” (p. 281).

Not only are such suggestions completely impractical in terms of time, knowledge, and resources, they would make absolutely no difference to the climate. The authors appear to want to advertise their ‘righteousness’ but their ideas are in fact quite selfish. When one grows more food than is needed, it can be exchanged with others for different goods and services. Indeed, this is precisely how capitalism began in the early monasteries.²

False prophets

The Scriptures consistently condemn false prophets. Jesus Himself warned against them and stated that they will be exposed by the bad fruit they bear (Matthew 7:15–20). A prophet’s word is validated by the truthfulness of their prophecy. Yet so many climate change prophecies of doom have turned out to be false!

As noted above, almost all the climate models have been shown to

be wrong. The IPCC predicted that global temperatures would continue to rise in the 21st century, but they have plateaued. Climate change alarmists like Tim Flannery, Ove Hoegh-Guldberg and Al Gore have repeatedly made dire predictions, including permanent droughts, the destruction of coral reefs, rising sea levels, more cyclones, and disappearing snow falls, yet none of their ‘prophecies’ have come true, and in many cases, the exact opposite has occurred. As Jesus said, “by their fruit you will recognise them” (Matthew 7:20).

Conclusion

This book is full of unsubstantiated assertions and claims, and the authors regularly impugn the thoughts and motives of literally millions of people, including Christians. They appear to be absolutely certain of the correctness of their views. They express no doubt or humility at all about the righteousness of their moral crusade to raise the alarm of catastrophic climate change and the need for urgent action. In their estimation, those who reject the notion of catastrophic man-made warming are not only ignorant, uncaring, selfish, and unjust, but idolatrous, sinful, distorters of the gospel!

I found this book embarrassing to read. It is one thing to advocate for good stewardship of creation and care for the poor, and to oppose pollution, but the positions taken by the authors would destroy Western civilization and impoverish billions. As a contribution to the debate on environmental issues from a Christian perspective, this book is practically useless. Indeed, one could retrieve the same alarmist nonsense from The Greens Party policy handbook.

The authors’ ignorance and apparent lack of respect for the facts are deplorable, which makes their following comment extremely ironic: “Christians are supposed to discover the truth and tell it, to uncover lies and expose them. Perhaps some

of the lies are self-deception, but it is then our job to expose those lies as well. If we do not expose the lies and proclaim the truth then we become part of a lie” (p. 59).

The irony continues when they implore readers to “prayerfully discern who to trust” and “seek to hear the voice of God for us today . . . it would pay to have very open ears and an open—but critical—mind!” (p. 116). It is clear they lack discernment, have closed and uncritical minds, and have heard the voices of fallible men rather than God.

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Taking the bite out of evolution—critical review of *Evolution's Bite*

Evolution's Bite: A story of teeth, diet, and human origins

Peter S. Ungar

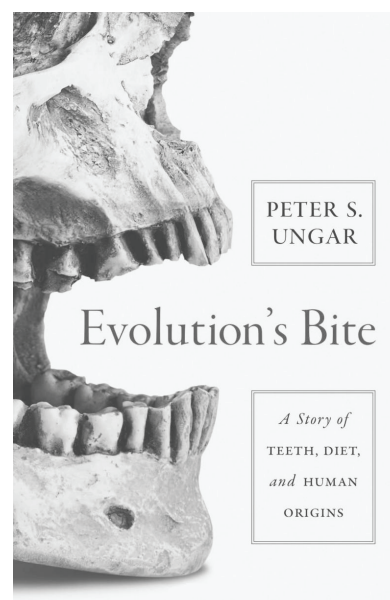
Princeton University Press,
Princeton, NJ, 2017

Jean O'Micks

Peter S. Ungar is a distinguished professor and director of the Environmental Dynamics Program at the University of Arkansas. He has published a couple of books on teeth, diet, and human origins. His new book, *Evolution's Bite*, follows a similar theme, describing how long-term global climate change, vegetation, food availability, dietary habits, and dental morphology all affected each other with regards to human origins.

How the structure and function of teeth affect each other

A key idea throughout the book is that since food and nutrition is necessary for organisms to keep living, the method of food acquisition and processing is also fundamental to an organism's well-being. The better an organism can acquire nutrients and energy, the more offspring it will leave behind. Teeth are 97% minerals, and are much stronger than bones, allowing them to survive over time, so are a major source of inferring dietary habits of extinct organisms. In the case of teeth, function and morphology go together largely hand in glove. Thus, carnivores such as lions have sharp teeth which can be used for tearing and



slicing flesh, whereas herbivores such as cows have flat teeth for grinding leaves and plants. In the case of primates, such as monkeys and apes, teeth have a rectangular crown, with four or five cusps, crests running up and over the cusps, forming basins in between them. Food can be sheared between individual crests, while it can be crushed with cusps pressed into the basins of the opposing teeth (p. 18).

The fact that certain animals have teeth with a given morphology seemingly designed for processing a certain kind of food does not exclude them from processing other types of food, something which the author also asserts. For example, gorillas in the Central African Republic are seasonal frugivores, in that they sometimes eat fruits, even though their teeth are designed to process leaves (pp. 43–45).

Ungar describes the Cope–Osborn ‘tritubercular’ model of mammalian

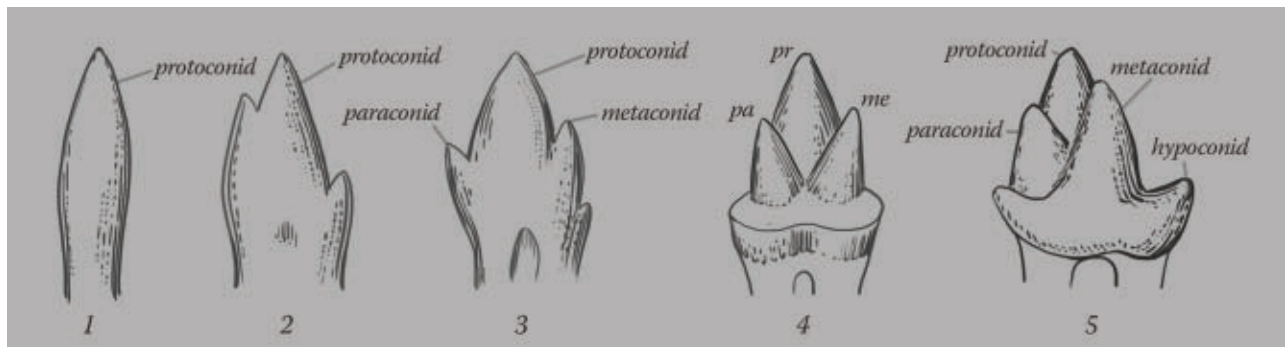


Figure 1. Supposed evolution of teeth from reptiles to mammals from the monoconodont stage to the tritubercular stage. The number of cusps on the teeth may vary from animal to animal, but the origin of the tooth itself is not addressed. (From Beddard, ref. 1.)

molar evolution. Cope and Osborn described the basic primitive tooth anatomy of the first mammals as being derived from the cone-shaped monoconodont teeth of reptiles. As different mammals adapted to different environments, newer cusps were added in different positions on the teeth (pp. 7–12). All this is fine and well, however, the model only deals with modification of a basic dental plan, but does not describe how teeth evolved in the first place. Nothing is mentioned about how dentine or enamel parts of the tooth evolved. This process is depicted in figure 1.¹

Organisms don’t live alone, however, but live together with other species vying for the same source of food. It has been widely observed that different primate species living in the same habitats each have different diets, despite access to the same food. This phenomenon is called species-specific dietary adaptation. For example, brown lemurs and ring-tailed lemurs on the island of Madagascar both eat fruits, leaves, flowers and bark, yet brown lemurs concentrate on leaves and travel a greater distance for food than the ringtails, which eat more fruits and move less, confined within the canopies of trees (p. 37).

Pages 41–47 describe the differences between the diet of mountain gorillas in the east (*Gorilla beringei*) and western lowland gorillas (*Gorilla gorilla*) in Africa. Mountain gorillas

mainly eat stems, leaves, and the pith of non-woody plants, and even bamboo shoots. As such, they have big, sharp, molar teeth with long crests for shearing and slicing leaves and stems. They also have long intestines to extract as much as possible from the plants they eat. As opposed to the eastern gorillas, western lowland gorillas eat much more fruit during the rainy season, and only fall back onto eating leaves, stems, and bark during the dry season.

This is pertinent to the account of the creation of land animals in the book of Genesis: “And to every beast of the earth and to every bird of the heavens and to everything that creeps on the earth, everything that has the breath of life, I have given every green plant for food. And it was so” (Genesis 1:30). The question is often asked as to how modern-day carnivores could have eaten plants at the beginning, after creation. Just as the two gorilla species that were just mentioned, which probably belong to the same created kind, can eat two different kinds of foods (fruits versus leaves and stems), so we could consider that carnivores, such as lions could also have been created in a similar way to be able to adapt to different diets. In comparison with gorillas, chimpanzees have large incisors and small molars for husking fruits and pulping their flesh (p. 74).

Differences in tooth morphology

This is an important aspect to consider, since in chapter 3, Ungar discusses how species must adapt to a changing environment over evolutionary time. Three basic options were open to different organisms when the environment changed, thereby changing the type of foods which were available: they could either move, change (or as evolutionists claim, ‘evolve’), or go extinct (p. 85).

In the case of our own species, this meant that humans evolved from tree-climbing monkeys in such a way as to be able to survive in a grassland environment, with sparsity of food and water, and with the presence of competitors and predators, also known as the savanna hypothesis of Raymond Dart. This supposedly pushed human evolution in the direction of bipedalism (freeing up their hands for tool use). Also, this came with a decrease in jaw size, in parallel with an increase in brain size, and therefore also intelligence. This allowed humans to escape predators and hunt other animals, so their teeth also changed to adapt to this new source of food (p. 66).

For example, the genus *Paranthropus* had large molars and premolars (hence the sobriquet “Nutcracker Man”), with relatively small front teeth and thick enamel, used for grinding shoots and leaves. *Australopithecus*, on the other hand, had larger front teeth,

including canines, used for eating a more varied diet, including meat. The genus *Homo* had even smaller teeth in comparison to the previous two genera. It was supposed therefore that *Australopithecus* lived during a dry period, whereas *Paranthropus* and early *Homo* lived during wetter periods.

Environment, food sources, diet, and tooth morphology

Chapter 4 in the book deals with the way the environment supposedly changed during the past four and a half billion years, due to the eccentricity of the tilt and precession of Earth's axis. Furthermore, dust produced in larger quantities during dry periods affects the strength of Earth's magnetic field (since dust particles are easily magnetized). Plate tectonics also influence global climate in shaping landscapes, and altering the flow of heat, water and salt. This is important to the theme of the book, since environment affects vegetation and food sources, which in turn affect the diet and oral morphologies of mammals (figure 2). Ungar presses the well-known propaganda of the environmentalist left, that average sea and land surface temperatures are on the rise, due to pollutants, supposedly including carbon dioxide accumulating in the atmosphere (p. 89). However, carbon dioxide is not a pollutant but rather the initial building block in sugar metabolism in plants.

This is important, in that it was originally assumed that the climate in Africa had remained the same inexplicably over millions of years, due to the uniformitarian idea that the present informs the past. Due to insight gained from the study of sediment layers on the ocean floors across the world, it was clear that the climate had changed in Africa. Massive environmental upheaval could possibly be explained by the Genesis Flood, which could have also caused the Ice Age.

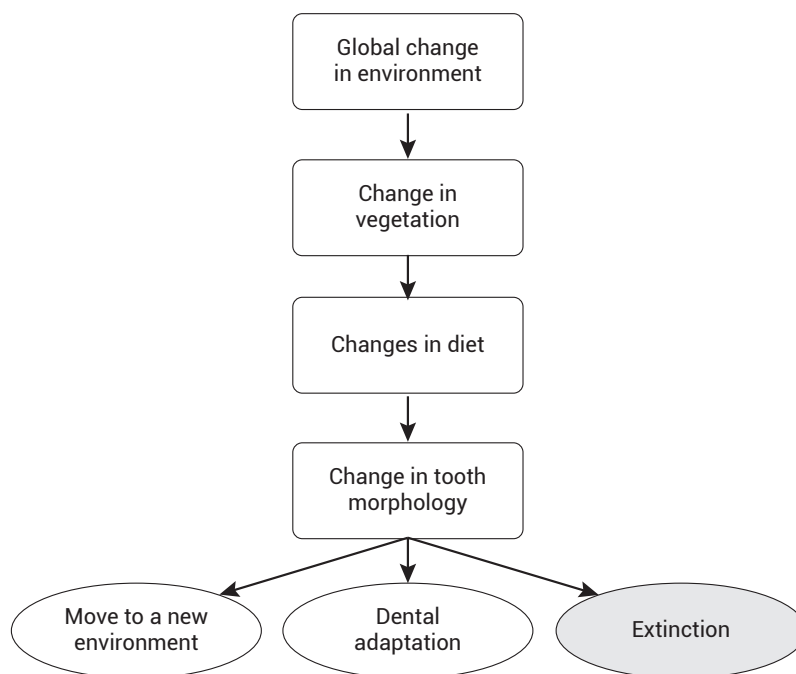


Figure 2. The process by which large-scale changes in the global environment cause changes in vegetation, causing changes to occur in available diet for mammals such as hominins. Three responses to this change are possible—relocation, dental adaptation, or extinction.

Finding and assessing 'foodprints'

Whimsically, Ungar describes foodprints in the following way: "Like footprints in the sand, foodprints give us evidence of actual activities of real animals at a moment in time in the past" (p. 114). Foodprints include scratches and pitting, caused by hard food sources such as nuts and seeds, which have to be crushed between teeth. However, dust also causes microwear on teeth and thus complicates the picture. Foodprints consist of not just microwear but also dental tartar and calculus which can inform us about the diet of a certain organism at a molecular level. Silica leached into the soil can accumulate in the cells of grass species, and can thus end up in the teeth of different species. In this amazing way, researchers can even track changes in climate.

In this way researchers also discovered that Neandertals were able to process and cook certain plant foods,² which implied controlled

use of fire, and had knowledge of medicinal plants and herbs, which implies knowledge of plant taxonomy.³ When viewed under the microscope, foodprints can aid in the taxonomic determination of different species. This is just a couple of ways in which Neandertals have been shown to be much more intelligent than previously imagined, virtually the same species as modern humans.⁴

Not only can microwear or dental calculus inform us about the diet of ancient primates and hominins, but also the ratio of ^{13}C to ^{12}C in their teeth as well. C_3 and C_4 plants, whose photosynthesis pathways are different, use ^{12}C and ^{13}C in different ratios, with C_4 plants using a higher ratio of ^{13}C overall. ^{13}C to ^{12}C ratios could also be influenced by the proportion of plants in a species' diet overall as well, and are also dependent on whether the species eats meat as well. This way it was found that both *Paranthropus* and *Australopithecus* had similar ratios of C_3 and C_4 plants in their diet (pp. 129–133).

Becoming human and the Neolithic revolution

According to Ungar, several differences exist between humans and other primates which make us unique. That is, we humans walk on two legs, carry and use tools, communicate with one another and can exchange information about the past and future, share and trade food, and hunt—even animals which are larger than us, and maintain a home base, or central place where food is brought to (p. 147).

Based on extant societies of hunter-gatherers still in existence in some parts of the world (the Australian Outback, sub-Saharan Africa and tropical South America), researchers could form theories as to how human society changed in transit to modern times. E.g. studies of the Hadza people in Tanzania showed that men had only a 3% chance of killing larger animals. So, to obtain enough food, women had to help out in collecting and harvesting vegetables, such as tubers (pp. 152–157).

Allegedly, a key element on the way to becoming human was the size of our teeth. Both *H. habilis* and *H. rudolfensis* had large incisors relative to their body size. *H. erectus* in comparison had smaller teeth. The author equates this with tool usage and cooking (signs of human intelligence), in that it allowed for preparation of food outside of the mouth. Cooked foods led to less microwear on teeth (p. 190). Furthermore, the length of a hominin's jaw depends on the stress that it has to bear during growth. On the other hand, tooth size is genetically determined, meaning that a tougher diet leads to more room in a person's mouth for teeth (p. 207). Indeed, certain markers of occupation or different kinds of activities can arise in the teeth due to the way they are used, such as dented incisors in carpenters while holding nails.² It is also interesting to note that based on this evidence (molar sizes), Bernard Wood of George Washington University and Mark Collins of Simon Fraser University both argue

that *H. habilis* and *H. rudolfensis* should be moved from the genus *Homo* to the genus *Australopithecus* (p. 166), something which has been supported also by morphology-based baraminology studies.⁵

Ungar recounts an interesting theory called the 'oasis theory', so named by geologist-explorer Raphael Pumpelly (pp. 170–172), which was a key element in the Neolithic Revolution, which has strong parallels with the account of the Genesis Flood. The Neolithic Revolution, he claims, was propelled by climate change caused by the recession of a great inland sea in central Asia. For example, a note made on a map in a book of the writings of Confucius discovered in Xinjiang Province referred to the Gobi Desert as 'Han-hai', or the dried sea. According to a theory by Loius Agassiz, a great part of Asia had been covered in glacial ice. This was supported by the fact that shells had been discovered in ice-age deposits in central Asia. This makes perfect sense in the light of Genesis which says that the waters of the Flood covered the whole earth (Genesis 7:19). In 1903, Pumpelly excavated the archaeological site of Anau, at the foothills of the Köpet Dag Mountains just south of the city of Ashgabat in modern Turkmenistan. There he found remains of deer, gazelle, and other wild animals, besides those of oxen, sheep, and pigs, as well as remains of wheat and barley, signs of the farming lifestyles.

For Ungar, it is a mystery as to why farming only started during the Neolithic Revolution, and why not earlier during human evolution. From a creationist point of view, the answer is relatively easy, as we know that the Genesis Flood swept over the whole earth (thus accounting for great inland seas in central Asia which are still receding), destroying everything in its path. Afterwards, after the people's languages were confused at Babel, people groups would have

spread out across the globe, starting farming communities here and there where there was good enough land. Indeed, in accordance with Genesis, many describe the geographical location of modern human culture as the Fertile Crescent, localized to the Near East and parts of northern Africa, extending from the upper Nile to the eastern Mediterranean to the sources of the Tigris and Euphrates rivers as they flow to the Persian Gulf (p. 175).

Conclusion

All in all, *Evolution's Bite* tells an interesting story on how environment affects food availability, which affects dietary patterns and tooth morphology in primates and humans. However, much of it is story-telling based on what the author imagines to be true, placing evidence into an evolutionary framework. However, several evidences presented in the book are also compatible with the story of human origins in Genesis. Therefore, we can trust in the Creator God Who revealed all of this information to us in the Bible.

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Faltering between two opinions: the epistemological conundrum of old-earth creationism

Controversy of the Ages: Why Christians should not divide over the age of the earth

Theodore J. Cabal and
Peter J. Rasor II

Weaver Book Company, Wooster, OH, 2017

Nick Sabato

In a glowing endorsement of *Controversy of the Ages*, Justin Taylor of The [Social] Gospel Coalition, and well-known opponent of biblical ('young earth') creation,¹ writes: "If I had the power to require every Christian parent, pastor, and professor to read two books on creation and evolution ... it would be *40 Questions about Creation and Evolution* (by Kenneth Keathley and Mark Rooker) along with the book you are now holding in your hands."² Having dispensed with the epistemological equivocation of the former,³ I wish to thank the editor for the opportunity to address some of the very same issues with the latter, a book which conveniently happens to be Ken Keathley's "new favourite" on the subject of the age of the earth.

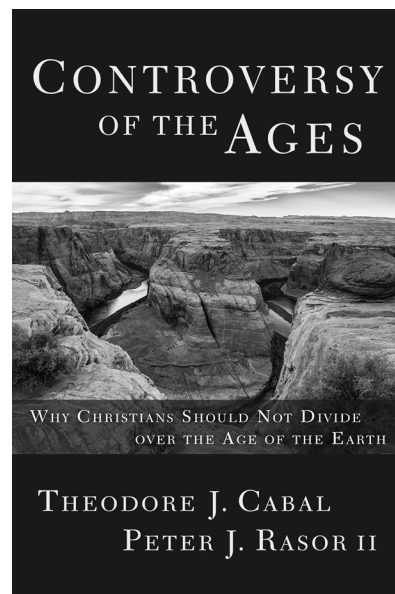
Cabal and Rasor are professors at Southwestern Baptist Theological Seminary. Since Dr Cabal appears to be the primary author, I will at times refer to him in particular. The authors divide creationist positions into three major groups: young-earth creationists (YEC), old-earth creationists (OEC), and evolutionary creationists (EC).

Although the criticisms of YECs' alleged shortsightedness and BioLogos' denial of inerrancy reveal the authors' inclination, Cabal confesses his position in chapter 9:

"My bias is rooted in my conservative evangelicalism. I think the earth is likely old but am not dogmatic about it. I firmly reject universal common descent. I hold with conviction to the Chicago Statement on Biblical Inerrancy. And I am consciously motivated by a desire to remain faithful above all to biblical orthodoxy such as the kinds of things [A] Mohler lists as examples of first-level doctrines. ... I believe AiG draws theological boundaries too narrowly and BioLogos too broadly. I have by far the deepest doctrinal concerns regarding the effects of BioLogos on the church. But I also have serious concerns about AiG's effect on the unity of the church" (pp. 190, 210).

Let me state at the onset that while I find many of the assertions made by Cabal and Rasor problematic, I respect their desire to maintain unity within the body of Christ in spite of the various opinions on the age of the earth. Their contention is that "those who believe they understand things rightly, they should humbly and patiently teach so as to nurture the unity of God's church. And if boundaries must be drawn, and at times they must, may they be outlined with exquisite Christian kindness and gentleness" (p. 225).

This is good, biblical advice. It is clear that the issue of division within the body is that with which the authors



appear to be most concerned. I begin the review by commending the authors for exhibiting intellectual humility and their confessedly high view of the doctrines of inerrancy and authority.

That being said, and while I do not wish to anathematize those who perhaps arbitrarily assume vast ages for earth history, the biblical and theological problems with 'evolutionary creation'⁴ go well beyond a disagreement about the age of things, and the authors admit such (p. 95).⁵ Many of their criticisms of BioLogos are shared by YECs and need not be reiterated here. Furthermore, while I adhere to "young-earth creationism" quite strongly, it is not because of a disproportionate obsession with the age of the earth over gospel non-negotiables. My concern is that the authors—like many others sympathetic to the old-earth position—ultimately miss the point of *why* the age of the earth is a point of contention among professing evangelicals.⁶

Cabal warns that "those coming to these pages hoping to find arguments for OEC or against YEC will be disappointed. Rather, the book provides perspective of the lines being drawn by Christians concerning the creation debate" (p. 14). To this end,

the book indeed provides some insight into the nature and history of the debate as well as Cabal's personal experience within this controversy. I think there are lessons to be learned in how we handle not only age of the earth debates but other tertiary doctrines (pp. 189–90)⁷ without glossing over their importance. What becomes apparent very quickly, however, is that epistemological considerations, while alluded to, are not given the necessary attention thus prohibiting the authors from confronting the primary issue when it comes to this *Controversy of the Ages*.

The Galileo affair

Galileo, the Copernican revolution, and the alleged clash of science and theology form the backdrop for evaluating the current age of the earth controversy. While the authors rightly admit that “the prevalent notion that science and theology have been perpetually at war is a myth” (p. 26), a great deal of time is spent trying to convince the reader that the modern conflict between creationist positions is a parallel to the 17th century controversy between the accepted orthodox cosmology and contemporary empirical findings. The implication is that if all parties would admit that they allow science to play a role in hermeneutics, YECs would retract their dogmatism because science is gradually supplying new knowledge to help us more accurately interpret Scripture. In other words, YECs should not embarrass themselves the way the 17th century church had by refusing to interpret the Bible in concert with the new cosmology.

In the first place, the geocentric view was not rooted in Scripture at all but in Aristotelianism.⁸ According to Jonathan Sarfati, “Many historians of science have documented that the first to oppose Galileo was the *scientific establishment*, not the church. The prevailing ‘scientific’ wisdom of his



Figure 1. The Aristotelian/Ptolemaic cosmology (Peter Apian's *Cosmographia* (Antwerp, 1539))

day was the Aristotelian/Ptolemaic theory” [emphasis in original].⁹ Even apart from this, it was just ‘obvious’ that the earth was fixed, and few people until the Middle Ages even thought to consider a moving earth. Schirmacher notes:

“Contrary to legend, both Galileo and the Copernican system were well regarded by church officials. Galileo was the victim of his own arrogance, the envy of his colleagues and the politics of Pope Urban VIII. He was not accused of criticising the Bible, but disobeying a papal decree.”^{10,11}

In Galileo's day, in order for the Roman Church State's interpretation to hold, it had not only to ignore any apparently contrary empirical data but also the fact that Scripture did not demand the Ptolemaic cosmology (figure 1) in the first place. When the contemporary YEC/OEC conflict is compared with the Galileo affair, critics of YEC seemingly hope that we will become embarrassed of our similar stubbornness in disallowing empirical findings to correct our interpretation of Scripture. But what is overlooked is that while the Bible does not provide a defence of the Ptolemaic cosmology, the Bible plainly teaches that “in six days God created the heavens and the earth” (Exodus 20:11).

The Copernican model was not in conflict with any teaching of Scripture¹² so the new cosmology posed

no actual threat to the authority of special revelation. In contrast, every old earth theory is of necessity in conflict with Scripture because the age of the universe is constrained by the biblical timeframe from Adam to Christ. In the current controversy one would be guilty of twisting Scripture to fit “scientific truth” (p. 43, 174)¹³ if he were to interpose vast eons into history despite the plain reading of the Mosaic account and NT affirmation of it. This hardly compares to the Galileo affair in which “[Galileo's] observations challenged the [Roman] Church's authority as the source of truth” (figure 2).¹⁴ There is not much open to interpretation in Genesis 1, so if God actually created the universe billions of years ago, then He surely intended to hide that fact from us by inspiring such a deceptive and misleading narrative.

The apparent motivation for using the Galileo affair as a launching pad in this discussion is to show that, according to Cabal, there is nothing wrong with utilizing science in biblical interpretation and that while both YECs and OECs do it, YECs

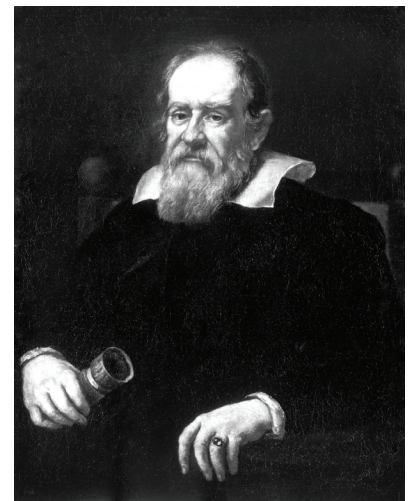


Figure 2. Cabal and Rasor admit that “Galileo also inserted himself into the theological fray at just the wrong time ... with the Counter-Reformation in full swing” (p. 35), and that, “Galileo's actual trial had more to [do] with [insubordination to the papacy] than a science-theology conflict” (p. 47). (Justus Sustermans—Portrait of Galileo Galilei, 1636.)

are hypocritical and inconsistent by lambasting OECs for their admission of such. For example: “Biblical interpretation influenced by science is not new, but when OECs do it, some YECs accuse them of submitting the Bible to ‘evolutionary’ science” (p. 159); “YECs themselves practice the very same approach by correlating their biblical interpretations in light of science they believe true. But condemning others for doing the same is hardly consistent or considerate” (p. 170). The book is full of examples of YEC utilization of scientific data in forming speculative *models*, but this cannot be confused with reinterpreting Scripture in accordance with science.

OEC's convoluted epistemology

I have contended that science should play no role in exegesis but that the student of Scripture adhere to the grammatical-historical hermeneutic.¹⁵ Such was the interpretative method that gave rise to the great Reformed confessions, all of which attested to the creation of the world in six literal days. This is significant because the formulation of the confessions predates the YEC/OEC controversy. Why did the framers of these theologically robust confessions bother to include a statement on the days of creation? It certainly wasn't because of some particular scientific data (or lack thereof). And it wasn't because they had an unbalanced obsession with the age of the earth and any such “level-three” doctrine. Their systematic formulation of key doctrines was rooted in Scripture as the source of knowledge rather than the imprecise epistemological smorgasbord so favourable to modern evangelicalism.¹⁶ The Westminster Confession (1646), Savoy Declaration (1658), and London Baptist Confession (1677/1689) all maintain that God created “in the space of six days, and all very good”. Yet, when YECs speak with unwavering confidence in the perspicuity of the

Genesis text and defend this historic formulation of the doctrine of creation, they are rebuked for making third-order doctrines primary.

The authors rightly assert that the “central methodological issue at stake [is] epistemological authority” (p. 42). Yet, repeatedly in the book we are confronted with statements like the following:

“[We should be reluctant to] adjust biblical interpretation unless proven science made clear the biblical interpretation had been wrong” (p. 209); “... No conflict exists between the truth of the Bible and God's creation” (p. 223);

“Both science and theology involve interpreting data (nature and the Bible)” (p. 21, footnote); “God is the author of the book of nature and the book of Scripture” (p. 45); and

“God's two books rightly interpreted cannot contradict. If the science is demonstrably true, then the conflicting biblical interpretation must be wrong” (p. 46).

Among other things, note the faulty “God's two books” approach to general and special revelation. Since general revelation is non-propositional, it must be interpreted within a worldview. The Bible, on the other hand, *is* propositional, not “interpreted” the way data must be.¹⁷ Further, what do the authors mean by “proven science” and “science ... demonstrably true”? Science is always tentative and, according to Karl Popper, furnishes “no ‘knowledge’ in the sense in which Plato and Aristotle used the word,”¹⁸ nor in the sense in which the Bible uses the word¹⁹ (or what Augustine meant by a “demonstrable fact”^{20,21}). If epistemological issues were squarely dealt with by the authors the real conflict would have to be not with YECs but with the philosophers and theologians who had long exposed the failure of empiricism.

The authors insist that declaring YEC and its central tenets (particularly

no animal death before the Fall) a “gospel issue” is “reckless” (p. 204). As usual, they overlook that human death alone is a problem for long ages, since their beloved ‘dating’ methods place fossils of dead humans—even murdered humans—before Adam. And while it is true that the “gospel issue” designation has been applied indiscriminately at times, it is ironic that Al Mohler—the one to whom the authors credit their “theological triage” method—gave a keynote address at ICR's 40th anniversary banquet subtitled, “Why creation is a gospel issue”.²² In his presentation, Mohler announces that “the pastors who are here, you are here because of a stance you have taken on behalf of the authority and inerrancy of the word of God.”²³ Likewise, reformed Baptist theologian Dr Richard Barcellos writes: “Does the gospel relate to the days of creation? I think it does Creation and new creation are vitally related in the biblical drama of revelation. Redemption by Christ is connected to creation in the space of six days.”²⁴ So much for relegating six-day creation to the periphery of Christian doctrine.²⁵

Of course, according to Cabal's own testimony, he affirms the authority and inerrancy of Scripture (pp. 22, 190). He contends that the issue is not with the alleged OEC rejection of inerrancy but with a mere difference of interpretation. But just as we have seen with other OEC spokesmen, the necessary exegesis of the Genesis text is lacking in such a proposal. It is hardly satisfactory for a biblical inerrantist to argue for an old earth yet fail to provide his interpretation of the relevant texts. My admonition of Keathley is likewise applicable here.²⁶

As the clarity of the Protestant confessions attest and the history of Christian doctrine confirms, the creation account is hardly an interpretive quagmire. After showing the incompatibility of old-earth theories with the historical narrative

of Genesis, Sam Waldron defends the historic confessional teaching on creation asserting thus: “If such language [in the Genesis narrative] is not intended to be taken literally, then it appears impossible to know with any certainty at all what the Bible intends to be understood literally and what it does not. There would then be an end to any meaningful assertion of biblical clarity or authority.”²⁷

Additional problems

Space does not permit a rebuttal to the numerous errant assertions made about YECs which are intended to form a cumulative case overturning our position that exegesis must not depend on scientific data. At times the authors use the word “transmutation” in reference to evolution and at other times to speciation. In this way they make the same mistake as both Ken Keathley and Hugh Ross in conflating speciation with evolution in what reeks of deliberate equivocation.²⁸ They write: “When does the degree and rate of YEC speciation become evolutionary itself? ... Without doubt, the employment of broad speciation in the service of anti-evolutionary YEC models is counterintuitive ...” (p. 146). Such confusion is unacceptable in light of the volume of YEC literature on the subject of speciation. The baraminic boundaries were set by God during Creation Week and speciation does not “become evolutionary” at any point.

Additional confusion surfaces when the authors take up radiometric dating, the geologic column and discarded YEC models.²⁹

Conclusion

A systematic defence of six-day creation about 6,000 years ago and a global flood is not an obsessive, unbalanced commitment to a tertiary doctrine but is first and foremost concerned to faithfully exposit and defend Scripture’s record of history. As

helpful as the theological triage concept is, it is also important to remember that theology is not a collection of fragmentary disconnected doctrines, but true propositions forming the fabric of an interwoven system. It is impossible to completely isolate and separate the tertiary doctrines from primary or secondary ones.

The authors want us to accept that both YECs and OECs interpret the Bible using science, and that doing so is not a problem. But if creationists only held to a “young” earth because of science, then they should be challenged to reconsider the role the Bible plays in their worldview.³⁰ We should not be YECs because “scientific truth corrected biblical interpretation” (p. 43). We should accept a recent six-day creation and global flood because of Scripture’s plain and perspicuous rendering of historical events, and be prepared to stand unthreatened by the epistemological futility³¹ of the natural man and his empiricism.³²

Christians should charitably accept Cabal’s testimony that he believes in inerrancy and authority, but YECs cannot help but find OEC talking points inconsistent with such a testimony. Old-earthers continually miss the point that “billions of years” is not some arbitrary target of bloodthirsty fundamentalists. There is evidence that acceptance of vast ages—and its corollary of death before sin—has at times served as a slippery slope resulting in more serious departures. Mortenson, Crowe and others have shown that “the compromise of [Charles] Hodge, [A.A.] Hodge, and [B.B.] Warfield, in spite of their good intentions and sincere evangelical faith, contributed to the eventual victory of liberal theology at Princeton after the latter’s death.”³³

But even if doctrinal downgrade is averted and one’s theology remains intact, there are still major hermeneutical and epistemological issues at hand, as we have briefly seen. If science informs our interpretation of the creation narrative, why does

science stop short of informing our interpretation of the Resurrection narrative? Since science ‘informs’ us that dead people do not rise from the grave, perhaps the proper interpretation of Christ’s burial account is that He was only three *minutes* in the grave, being not actually deceased. Of course, Cabal would not argue that science prohibits the Resurrection. But the point is that here arises an issue of foundational importance, that of epistemological consistency. On what basis can one restrict the hermeneutical integration of ‘scientific truth’ only to the creation and flood narratives? What parameters keep empiricism from ‘correcting’ other historical events recorded in Scripture? It seems the liberals are more consistent in applying such a higher critical filter to the whole canon, which is precisely why YEC concerns about concessions to non-revelational “truth” are worth heeding.

My main concern for those who take an opposing view on the age of the earth is not so much that a Christian holds to an old earth, but *why* he holds to an old earth. For all the talk about biblical authority and inerrancy, this point seems to be lost on Cabal and Rasor. They acknowledge that BioLogos is unorthodox in its view of inerrancy. As such, proponents of EC are free to twist and contort the text of Scripture however they see fit. But for the one who professes to uphold the authority and inerrancy of God’s Word, OEC is not just simply a difference of interpretation but is necessarily rooted in and defended by an appeal to extra-biblical non-propositional data.

Contra Cabal and Rasor, the age of the earth really is not an “extremely difficult biblical, theological, scientific and philosophical debate” (p. 224) at all when a revelational epistemology is upheld and consistent hermeneutic applied. So I agree with them that Christians should not divide over the age of the earth—old-earthers should cease their divisive *Scriptura sub Scientia* approach!

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2. Why Christians should not divide over the age of the earth, blogs.thegospelcoalition.org, 8 May 2017.
3. Sabato, N., Irreconcilable records of history and muddled methodology: book review of '40 Questions about Creation and Evolution', by Ken Keathley and Mark Rooker, *J. Creation* 30(1): 19–24, 2016.
4. 'Evolutionary creation' is the authors' (and BioLogos') preferred term to 'theistic evolution'.
5. Chapters 8 and 9 address some of these concerns. It is also telling that everyone the authors list as "influential evangelicals" (p. 23) serving as endorsees to BioLogos are on the outer fringes of orthodoxy. Denis Lamoureux's claim that "evolutionary creationists enjoy a personal relationship with Jesus" (p. 73) marks a greatly diminished testimony compared to the confessional precision of those who understand the doctrine of justification. Such bears witness to the state of evolutionized evangelicalism.
6. A note on the term "evangelical" which the authors admit has been "difficult to define" (p. 21): The broad spectrum of groups listed by Cabal and Rasor as deserving of the title is a bit suspect and may help to explain why such lenience is given to an allegedly (relatively) peripheral subject like the age of the earth.
7. The term 'theological triage' was popularized by Dr Al Mohler and can be a helpful one in assessing the relative importance of various doctrines. The authors' application of this concept is the focus of study in chapter 9. See Mohler, R.A., Jr, A call for theological triage and Christian maturity, July 12, 2005; albertmohler.com/2005/07/12/a-call-for-theological-triage-and-christian-maturity.
8. Clark, G.H., *Modern Philosophy*, The Trinity Foundation, Unicoi, TN, pp. 32–35, 2008.
9. Sarfati, J., Galileo quadricentennial: myth vs fact, *Creation* 31(3):49–5; creation.com/galileo-quadricentennial.
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11. William Webster similarly recalls that "[Rome] condemned the theory because, in its view, it was contrary to the teachings of Scripture and the Church possessed the infallible right to determine the proper interpretation of Scripture ... It was not that the Bible itself was wrong, but that the particular interpretation the Roman Catholic Church had adopted was wrong." Webster, W., *The Church of Rome at the Bar of History*, The Banner of Truth Trust, Carlisle, PA, p. 69, 1995.
12. As long as the scriptural use of phenomenological or reference-frame language is admitted. The denial of this type of language is exemplified in the erroneous statement of geocentricist Gerardus Bouw: "If God cannot be taken literally when he writes of the 'rising of the sun,' then how can he be taken literally in writing of the 'rising of the Son?' (p. 201). Compare Carter, R. and Sarfati, J., Why the Universe does not revolve around the Earth: Refuting absolute geocentrism, creation.com/geocent, 12 February 2015, updated 19 July 2017.
13. I object to the term 'scientific truth' first because it presupposes the validity of the competing epistemology of empiricism. "Truth, of course, is an insuperable problem for empiricism: Truth cannot be derived from something non-propositional, such as 'observations.' Unless one starts with propositions, one cannot end with propositions." Robbins, J.W., *Without a Prayer: Ayn Rand and the Close of Her System*, The Trinity Foundation, Unicoi, TN, p. 78, 2006.
14. MacCulloch, D., *Christianity: The First Three Thousand Years*, Viking, New York, p. 684, 2009. MacCulloch attributes Rome's dogmatism in the Galileo affair to the "papacy's defensiveness after Luther's rebellion ... Galileo's trial also happened during the Thirty Years War ... a time when the Pope was feeling unusually vulnerable".
15. Sabato, N., A theologian's disappointing departure from biblical creation, *J. Creation* 28(3):125, 2014.
16. "[Empiricists] have exchanged infallible propositional revelation ... for fallible sense experience ... Thomas Aquinas, the great thirteenth-century Roman Catholic theologian, tried to combine two axioms in his system: the secular axiom of sense experience, which he obtained from Aristotle, and the Christian axiom of revelation, which he obtained from the Bible. His synthesis was unsuccessful ... Today the dominant form of epistemology in putatively Christian circles ... is empiricism. Apparently today's theologians have learned little from Thomas' failure." Robbins, ref. 13, p. 337.
17. Scripture is 'interpreted' (in the sense of determining authorial intent), but not in the way that non-propositional sensory data must be. This is just one example of equivocation by the authors.
18. As cited in Robbins, ref. 13, pp. 256–257.
19. "The fear of the Lord is the beginning of wisdom, and the knowledge of the Holy One is understanding" (Proverbs 9:10). See also Proverbs 1:7 and Colossians 2:3.
20. Sibley, A., Lessons from Augustine's *De Genesi ad Litteram—Libri Duodecim*, *J. Creation* 27(2): 71–77, 2013.
21. Cosner, L., Sarfati, J., Non-Christian philosopher clears up myths about Augustine and the term 'literal', *J. Creation* 27(2):9–10, 2013.
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23. Mohler, ref. 22, timestamp 0:01:40.
24. Barcellos, R.C., *Better than the Beginning: Creation in Biblical Perspective*, Reformed Baptist Academic Press, Palmdale, CA, p. 88, 2013.
25. Granted, in the article (ref. 7), Mohler does not mention the age of the earth and we would assume that he would not categorize such as a "first-order doctrine". However, he rightly contends that "the truthfulness and authority of the Holy Scriptures must ... rank as a first-order doctrine", and this—not the age of the earth *per se*—is the heart of the issue. While Cabal and Rasor affirm the authority and inerrancy of Scripture, their empirically tainted hermeneutic only serves to cast doubt on Scripture's perspicuity.
26. "... If [one] is truly convinced that his embrace of old-earth creationism does not subvert the authority and inerrancy of Scripture, then he is obliged to provide the exegetical substrate for his position. However, not even once does he defend his unidentified brand of old-earthism from the text of Scripture. This fact alone makes it plain that he is not treating the Scripture as his authority, at least not when it speaks to the subjects of creation and the Flood. It is quite insufficient ... to merely take up a vague 'old-earth creationism' without addressing the biblical text and without putting forth one of the inevitable compromise 'solutions'. If a professing Christian wants to be an old-earthier, it is incumbent upon him to find—rather, force—the oldness somewhere [into] the text" (Sabato, ref. 15).
27. Waldron, S.E., *A Modern Exposition of the 1689 Baptist Confession of Faith*, 5th edn, EP Books, Welwyn Garden City, UK, p. 91, 2016.
28. Sabato, N., Yet another old-earthier accuses a creationist of believing in evolution, creation.com/keathley-ham, 12 April 2016.
29. Andrew Snelling is targeted as an example of a YEC who reinterprets Genesis because of scientific data (p. 177) and Terry Mortenson as one who is soft on the scriptural geologists despite their own inconsistencies in the handling of God's Word.
30. The issue of epistemology is all too often overlooked, but Joel Tay has it right: "... since induction is always a formal logical fallacy, scientific models are always held loosely and never elevated to the same epistemic level as Scripture... This is ... the reason why it is necessary to hold to biblically deduced propositions authoritatively and scientifically inferred models loosely." Tay, J., Design by intuition: good biology, naive philosophy, *J. Creation* 31(2):47, 2017.
31. I am indebted to William Downing for the phrase "epistemological futility", which adequately describes the "wisdom of the world" (foolishness with God) upon which the unregenerate man is dependent. See Downing, W.R., *The Bible and the Problem of Knowledge*, PIRS Press, Morgan Hill, CA, 2006 or my review in *Creation Research Society Quarterly* 52(3):226–227, 2016.
32. To illustrate this point, one should not reject Christ's 'real presence' in the eucharist because biochemical analysis fails to reveal hypostatic DNA. One should reject any such teaching on hermeneutical grounds recognizing Christ's use of figurative language. We do not need the discoveries of modern science to rightly interpret God's Word, we simply need a return to the grammatical-historical method.
33. Mortenson, T. and Ury, T.H., (eds.) *Coming to Grips with Genesis: Biblical Authority and the Age of the Earth*, Master Books, Green Forest, AR, p. 97, 2008. For a masterful account of Princeton's gradual degeneration, see Crowe, D.D., *Creation Without Compromise*, CBP, Brisbane, creation.com/s/10-2-651, 2009.

Evolution smuggled in under the rubric of popular misunderstandings of natural phenomena

Scienceblind: Why our intuitive theories about the world are often so wrong

Andrew Shtulman

Basic Books, New York, 2017

John Woodmorappe

The author is identified as Associate Professor of Psychology and Cognitive Science at Occidental College. There he directs the Thinking Lab. His degrees are in psychology, not biology, and yet he portrays himself, to the reader, as an authority on organic evolution. As discussed below, his descriptions of organic evolution are simplistic and apologetic, and reminiscent of those of an old high school biology textbook.

Shtulman discusses many popular children's misconceptions, including about physics. That is a strength of this book. However, his discussion of some of these is deficient, and I supplement his statements with those of my own experiences as a science teacher.

The author exhibits a condescending, almost snobbish attitude towards those who disagree with him on certain things—such as a man-caused global warming crisis (pp. 121–124). He also displays strong rationalistic prejudices against such things as life after death and the efficacy of prayer.

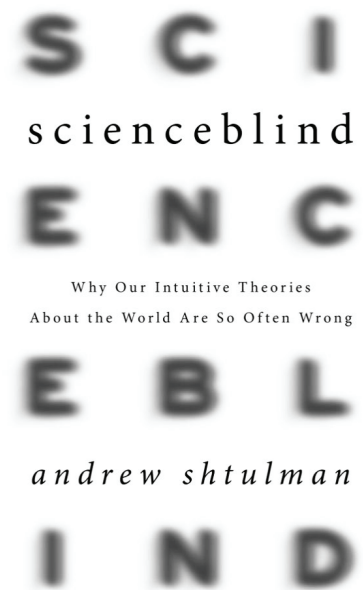
Piaget's theory is largely discredited

For a long time, psychology textbooks had taught us that young children do not realize the fact of conservation of volume, when the water in a tall container is poured into a wide container, because they are pre-operational. On the other hand, Shtulman suggests that, contrary to the Swiss psychologist Piaget, there is no 'pre-operational' and then 'concrete-operational' stage in children. Instead, children learn conservation of weight, volume, etc., at different times. It is simply a matter of children coming to realize which transformations change the substance in one way but not another.

It all has to do with overcoming errors of conservation. Not only young children get fooled by volume of liquids. When adults look at a slanted pint glass, they are liable to underestimate the amount of volume lost when the level of liquid drops a small amount.

Adults, too, are fooled; so are scientists

Density is not an easy concept to grasp by children—or even adults. This is why the question, "What weighs more, a pound of gold or a pound of feathers?" is not altogether ridiculous. This is because it is common for even adults to conflate heft and bulk with density. For instance, it is apparent that a block of metal will sink, and that a styrofoam peanut will float, but it is not



so easy to see that a speck of metal will sink and a giant block of styrofoam will float. Again, heft and bulk get in the way of thinking accurately. In addition, the fact that the high surface tension of water may prevent the speck of metal from sinking as a block of metal would, makes it difficult to see the fact that density is completely independent from size and mass.

Lest the layperson feel unintelligent, this need not be. Shtulman warns the reader that even long-experienced scientists drift into intuitive-but-incorrect ways of thinking. He quips: "Heat, sound, light, and electricity are all preferentially viewed as substances, and no amount of training can scrub these substance-based views from our brains" (p. 56).

Conceptual hindrances to the effectiveness of 'discovery' science-teaching methods

The author describes a series of experiments in which middle school students could, using balls and ramps, empirically determine for themselves the counter-intuitive fact that more-massive balls do not roll down ramps any faster than do less-massive balls.

Another group just simply read in a textbook, written by an authority figure (science educator), that objects roll down ramps at the same speed, regardless of their mass. Both groups were tested, and, unexpectedly, textbook-instructed students were more likely to acquire a correct understanding of the independence of mass and gravitational acceleration than those who studied this experimentally.

Why was this so? Shtulman reminds us that it took centuries of experiments by scientists to arrive at the truth, and in particular to overcome their ingrained intuitive belief that more-massive objects roll (and fall) faster than less-massive ones. Surely it is unreasonable for a group of children to accomplish the same in just one experiment!

The best way to use hands-on methods of science instruction, in Shtulman's opinion, is through instructor-guided experiments. Consider, for example, teaching the counter-intuitive fact that the table exerts an upward-acting force on the book sitting on it just as surely as gravity exerts a downward acting force on the book. The instructor puts the book on a spring, and students see that the spring pushes back up against the book. However, there is too large a conceptual gap between the spring exerting an upward force and the table doing the same. So the instructor introduces bridging observations: A fairly stiff foam pushing back up against the book, then a thin board pushing back up against the book, and finally the apparently unchanged table pushing back up against the book.

Learning from authority figures versus learning by empirical observation

The foregoing has unmentioned implications which I now discuss. Rationalists have long snickered at

religion, telling us that, in religion, you accept something merely because some authority figure (preacher, Bible, etc.) tells you so, whereas in science and reason, you accept something because you have empirically verified it for yourself.

We see from this book that the foregoing caricature is a gross oversimplification. Even in science, there is considerable overlap between an-authority-said-so and see-for-yourself enlightenment. Finally, not only science, but also religion, has to struggle against ingrained misconceptions. In both science and religion, things are not always what they seem. In science, it is our ignorance and our limited and misperceived understanding of the natural world. In religion, it is our sinfulness and our limited and misperceived understanding of God and His ways.

More needed in explaining misconceptions about motion

Author Shtulman does a fairly good job in explaining to the reader why both scientists and non-scientists had taken so long to grasp the reality of Newton's three laws of motion (figure 1). However, he could have done better. I provide the following illustrations.

For an object to continue moving forever, it would have to be in a frictionless environment. There are no frictionless environments on Earth. Thus, every rolling or moving object must eventually come to a stop. No wonder that it was hard to conceive that a moving object would—by default—continue moving forever. It is hardly surprising that it was thought that every moving object has impetus (or, later, momentum), which it runs out of, causing it to stop.

If humans could have travelled to space centuries ago, they would have experienced first-hand a virtually frictionless environment. Pioneer

10 and 11, having reached escape velocity from the Sun, and now beyond the solar system, are moving in essentially a straight line, and will continue doing so 'forever', until they run into an object or are deflected by its gravitational pull. This is a graphic illustration of Newton's First Law of Motion. In space it is easy to see that an object continues moving by default, that there is no such thing as impetus, and that 'something else' (friction) is what causes moving objects to stop on Earth whenever there is no apparent cause for their cessation of motion.

The space environment would also have helped in an earlier discovery and appreciation of Newton's Third Law of Motion. Normally on Earth it is usually not easy to see that one action of our body creates an equal and opposite reaction. In space weightlessness, it is quite evident. For instance, when the first attempts, in the 1960s, were made by the Gemini astronauts to perform effective work while on spacewalks, they soon became exhausted while trying to control the motions of their bodies. An astronaut would thrust his arm forward, and that would cause his whole body to drift backward, and also to start rotating backwards about the centre of mass of his body. That is a classic demonstration of Newton's Third Law of Motion. It was solved by astronauts clamping their bodies to the spacecraft during spacewalks. The spacewalker's challenges are not experienced on Earth owing to the restraining effects of gravity, with the exception of extreme circumstances, such as the boxer who must position his feet in order to prevent getting thrown backwards whenever he delivers a hard punch, or the gunman who feels the recoil of a firearm while it is discharging.

Finally, author Shtulman missed a chance to discuss a classic example of intuitively held misconceptions about Newton's third law—that of rocket propulsion. It is commonly

but erroneously believed that rocket propulsion works because the exhaust gas pushes against air. It is not difficult to figure out why: The human experience with rockets is normally limited to their operation in Earth's atmosphere. If humans could have observed rockets firing in space centuries ago, they would quickly have realized that rocket propulsion works fine in a vacuum, despite the fact that there is no air for the exhaust gases to push against. Ironically, rockets actually function better in a vacuum

because there is no air resistance acting against either the expulsion of the gases in one direction and against the motion of the rocket in the other.

Mass and weight: supplementary information provided

The author touches on how people misconceive weight as being a constant. They do so because they lack experience with the fact that the weight of a given object varies a little from place to place on Earth, and

that would likely differ entirely from that on Earth were the object to be moved to another planet. In addition, Shtulman fails to address a major common misconception—that which confuses mass with weight.

The erroneous conflation of mass and weight stems from the fact that, not only does weight seem to be a constant, but also the weight of an object 'follows' that of its mass. Yet they are not synonymous. An analogy I have found useful, as a science teacher with my students, is that of



Figure 1. Newton's three laws of motion seem simple and intuitively obvious, but they took centuries of overcoming misconceptions to realize.

two unequal-height objects and their respective shadows. The length of the shadows change according to the position of the sun in the sky, but the length of the taller object is always greater than the length of the smaller object. After sunset, and on cloudy days, the objects cast no shadows at all, but one object still remains taller than the other. Clearly, the objects can exist without their shadows, but the shadows cannot exist without the objects.

In this analogy, the heights of the objects are their ‘masses’, and the shadows are their ‘weights’. In real life, the weights of objects can vary greatly from planet to planet, but the weight of the more-massive object is always greater than the weight of the less-massive object. While orbiting Earth, neither object has any weight, but they still retain different masses. So mass can exist without weight, but weight cannot exist without mass.

Let us further illustrate the independence of mass from weight. Imagine a mouse and an elephant in a spacecraft while orbiting Earth. Both weigh nothing. Yet the fact that mass still exists is proved by the fact that it takes a much smaller force to accelerate the floating mouse across the cabin than it is to accelerate the floating elephant, does the same degree as the floating mouse, across the cabin. This also illustrates Newton’s Second Law of Motion, which acts regardless of the presence of weight.

The author’s misconceptions about evolution

Ironically for an author writing a book about science misconceptions, he entertains some of his own. Shtulman credits Darwin with coming up with the concept of selective survival and reproduction of well-adapted organisms, over many generations, at the expense of less-adapted organisms (p. 203). This is incorrect. The concept was developed by creationist

Edward Blythe, if not earlier. In fact, none other than Stephen Jay Gould, a famous evolutionist and rather strong anti-creationist, nevertheless acknowledged that “Natural selection ranked as a standard item in biological discourse among the pre-Darwinian creationists.”¹

Shtulman also brings up the peppered moths. He correctly notes that natural selection does not imply that individual moths themselves become darker over successive generations. Instead, it means that dark moths become more common, and light-coloured ones less common, over many generations, and that this owes to differential reproduction and natural selection. However, although the peppered moths have long been textbook orthodoxy, Shtulman appears to be unaware of the fact that serious questions have been raised about the validity of Kettlewell’s original experiment on the peppered moths, e.g. the ‘camouflaged moth’ photos were staged.

As a psychologist, not biologist, Shtulman shows a naïve lack of understanding of the now-known functions of such ‘vestigial’ structures as the whale hipbone. His knowledge is definitely not up to date.

Evolution is inherently atheistic

Unlike far too many Christians, author Shtulman has no illusions in this regard:

“Widespread endorsement of theistic evolution is thus good from a sociological perspective, but it may not be good from a cognitive perspective, as theistic evolution is logically problematic. The evolutionary machinery of mutation plus natural selection (see Chapter 12) leaves no role for divine intervention—at least no role beyond what scientists can learn about evolution without making such an assumption” (p. 238).

I long ago described this in a somewhat graphic manner.²

The author, in a roundabout way, identifies some of the reasons that students are prone to believe that God and evolution are compatible—besides of course their desire to embrace evolution while hanging on to God. Students labour under misconceptions of evolution in terms of essentialism (what is the animal’s core nature?), intentionality (what does the organism *want*?), or teleology (what does the organism *need*, or more accurately, what is the organism *for*?). In actuality, evolution is a blind process of differential survival that is oblivious to the wants and needs of *any* entity (including God).

The author laments the fact that children seem to be ‘intuitive theists’ and that they tend to have ingrained creationist beliefs from an early age. Worse yet, not a few adults hold the same views. Shtulman does not grasp the fact that no evidence has been found that demonstrates that specified complexity can spontaneously arise from disorder. Maybe *that* is the real reason that so many adults conclude that the evolutionary explanation does not ‘add up’. He also fails to realize that no evidence has shown that one organism can be transformed into a radically different organism. Perhaps *that* is the real reason that people tend to persist in essentialist views of living things.

So-called theistic evolution is inconsistent with God’s character

Shtulman has a better grasp of the situation than do far too many Christians. He quips:

“Theistic evolution also flies in the face of what most people believe to be true of God, namely, that God is omnipotent (all-powerful), omniscient (all-knowing), and omnibenevolent (all-good). Why

would an omnipotent being choose random mutation as a starting point for evolutionary change rather than directed mutation or, for that matter, plain old creation? Why would an omniscient being produce superfluous or imperfectly designed forms, like the human tailbone, the whale hipbone, the snake leg bone, the ostrich wing, or the rabbit stomach (which is so inefficient at extracting nutrients that rabbits must eat their feces so as to digest their food twice)? ... And, most troubling, why would an omnibenevolent being use natural selection as a tool for creation? Natural selection is a cruel process, as noted in Chapter 12. Most organisms die of starvation, predation, or disease before reaching reproductive maturity” (p. 238).

The author (like theistic evolutionists!) has no understanding of the Fall and its consequences, as he continues:

“Does God delight in watching orcas drown baby seals by the dozens? Watching wasp larvae devour caterpillars from the inside out? Watching viruses annihilate entire populations of humans, including infants and children? Billions of ‘God’s creatures’ have died violent, painful deaths, and 99.9 percent of earth’s species have gone extinct. Why would an omnipotent, omniscient, and omnibenevolent being have created all those life-forms just to destroy them?” (p. 238).

(The 99.9% figure is based on evolutionary deep-time beliefs, not facts).

The author’s rather primal anti-supernaturalism

The author expresses puzzlement at the ‘misconception’ that supernatural forces have an outcome on diseases. He sees this as yet another holdover of intuitive theories that continue to

persist in spite of the ‘correct’ scientific explanation of diseases being caused by pathogenic bacteria and viruses. He laments that:

“For Christians and Jews, reprieve from illness is one of the most common forms of petitionary prayer. Christians and Jews seek God’s help even in coping with infectious diseases, like hepatitis or pneumonia. They do so not because they are unaware that infectious diseases are caused by germs but because they view God and germs as complementary. God is the distal agent of human health and germs are the proximal agent” (p. 200).

He ridicules such beliefs by comparing them with the Hmong belief that epilepsy is caused by demon possession, and the Creole belief that tuberculosis is caused by sorcery. According to Shtulman’s reductionistic mentality, diseases are caused by germs and viruses, and nothing more.

The author’s intellectual arrogance and rationalistic hubris are as astounding as they are foolish. What makes him think that he has exhaustive knowledge of *every* cause of events (including human illness) that take place in the universe? Ironical to his criticizing others for being science-blind, Shtulman is the epitome of science-blindness himself—by failing to even have a clue about the limitations of science.

More fundamentally, what makes him think that there is only one valid layer of explanation for whatever takes place? As an example, consider the person who walks to the post office to mail a belated letter to a government query, and is hit and injured by a car. What caused it? Newton’s Third Law of Motion, which implies that two objects in rapid collision will do damage to both? The choice of the driver to be careless? The choice of a nearby shopkeeper to put up gaudy signs that attracted attention and facilitated distracted passerby drivers? The choice of the

builder in constructing a building that prevented the pedestrian from seeing the oncoming car sooner? The choice of the pedestrian to be less than fully inattentive? The decision of the government to send a query, to a citizen, which requires a personal response via paper mail? The failure of the government to put a stop sign at the nearby corner, which would have stopped the car and refocused the driver? God’s decision as to who gets spared, who gets injured, and who dies in an accident? All of the above?

No immortal soul: we are nothing more than a combination of atoms

The author focuses on children’s misconceptions about death. This includes their lack of comprehension of the fact that death is irreversible. (I can relate. When I was five years old, my grandmother died of cancer. When no one was watching, I lifted up one or both eyelids on her body, thinking that opening her eyes would bring her back to life.)

Shtulman partly blames religious teachings, on the afterlife, for children’s misunderstandings about death. He shows his thoroughgoing materialistic bias as he makes this revealing statement: “Religion dictates that humans are blessed with an immortal soul, whereas evolution dictates that humans are material creatures through and through” (pp. 238–239). Really? How can he know *that*? And he is lecturing *us* not to jump to conclusions or rely on hunches! Physician, heal thyself.

If anything, modern science should make more credible the belief that the Self can survive death, even if the Self is nothing more than the neuronal firings in our brain. By analogy, the printed text in a WORD program is the manifestation of electrical impulses in the computer. Yet, if the text is saved, the text can be sent across cyberspace, and end up open in another computer,

even if the original computer that made it is destroyed, and its electrical impulses have long died out. Likewise the Self, even if merely the product of neurobiological processes in the brain, can exist outside the brain upon its destruction at death, and can be implanted in another body.

Ironical to the author's primal (even vulgar) materialism, some secular scientists have begun to toy with the idea that consciousness is more than just the firing of neurons in the human brain. Some have gone as far as suggesting that 'inanimate' matter, and even the entire universe, may be conscious in its own way.

Conclusions

This book is strong in its analysis of common misconceptions in physics, but quite weak, and rather doctrinaire, in its understanding of organic evolution. The author emphasizes misconceptions in science, but, in some ways, is the worst offender. That is, he has a weak to non-existent understanding of the absence of hard evidence for organic evolution. In addition, his thinly veiled anti-supernatural biases show through in such things as his disparaging of belief in life after death, and of the role of God in allowing or healing illnesses.

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A history of humankind distorted by evolutionary thinking

Sapiens: A brief history of humankind

Yuval Noah Harari

Vintage Books, London, 2014

Peter Line

The book *Sapiens: A brief history of humankind* is written by Yuval Noah Harari, an Israeli historian who lectures at the Hebrew University of Jerusalem. From his book Harari makes clear his belief that: "As far as we can tell, from a purely scientific viewpoint, human life has absolutely no meaning. Humans are the outcome of blind evolutionary processes that operate without goal or purpose" (p. 438). Hence, as his view of history is based on a blind acceptance of atheistic evolution, it is no surprise that Harari's adherence to this materialistic dogma greatly influences his view of history.

The book does not attempt to argue the case for evolution, rather it just assumes it to be true, and then conveniently selects tales, from the evolutionary just-so stories approved menu list, that suit the narrative of history being espoused. As such, if evolution is false, then a lot of the events described in the book never happened, particularly regarding prehistory, or are misinterpreted by being viewed through the distorted lens of evolution.

The book is lengthy (466 pages excluding notes and index), covering a lot of ground, with a tendency to discuss topics superficially, moving

A Brief
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Humankind



Sapiens

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Harari

quickly from one subject to another. This necessitates this review being very selective in items looked at, focusing mostly on the first part of the book, as that is where evolution is most heavily relied upon to interpret history.

Big assumptions

The opening sentence of the book makes it clear that the big bang theory of the origin of the universe 13.5 Ga ago is accepted as fact (p. 3). Also assumed is that life on Earth began 3.8 Ga ago, when "certain molecules combined to form particularly large and intricate structures called organisms" (p. 3). However, the big bang theory is beset with numerous insurmountable problems,¹ and naturalistic origin of life scenarios are essentially discredited,² and so the blind acceptance of these events is not a good start. The reader is informed

that three important revolutions shaped the course of history—the Cognitive, Agricultural, and Scientific revolutions—and the book is said to tell “the story of how these three revolutions have affected humans and their fellow organisms” (p. 3).

The usual ‘ape-man’ story

We are told: “Just 6 million years ago, a single female ape had two daughters. One became the ancestor of all chimpanzees, the other is our grandmother” (p. 5). The author also clarifies that he uses the term ‘Sapiens’ to refer to members of the species *Homo sapiens*, with the term ‘human’ referring “to all extant members of the genus *Homo*” (p. 6). It is said that “Humans first evolved in East Africa about 2.5 million years ago from an earlier genus of apes called *Australopithecus*”, and that about 2 Ma ago some of these ‘archaic’ humans migrated to North Africa, Asia and Europe (p. 6) (figure 1). Neandertals and *Homo erectus* are said to have evolved from these migrating humans, the latter supposedly having survived for close to 2 Ma (p. 7). The dwarfing of some of these archaic humans on the island of Flores is the tale put forward to explain the emergence of the tiny human known as *Homo floresiensis* (also humans known as ‘hobbits’) (pp. 7–8). The mystery species *Homo denisova* is briefly discussed, as is the alleged continuous evolution in Africa, producing species such as *Homo rudolfensis*, *Homo ergaster*, and eventually *Homo sapiens* (p. 8). This is all standard evolutionary talking point stuff which is again, like with the big bang and naturalistic origin of life, blindly accepted as fact. Creationists dispute the evolutionary origins of *Homo sapiens*, with alternative assessment of the so-called ‘ape-man’ fossils available.³

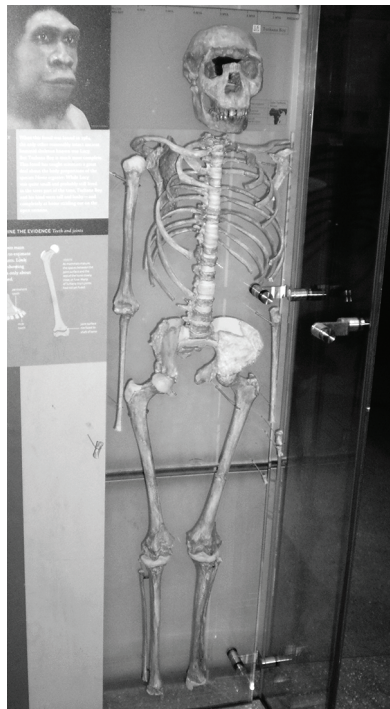


Figure 1. A replica skeleton of the *Homo erectus* Nariokotome Boy (KNM-WT 15000) from West Turkana, Kenya, displayed at the American Museum of Natural History, New York. It is also known as Turkana Boy. Some refer to it as a member of *Homo ergaster*. It is dated by evolutionists to 1.6 Ma ago.

Large brains and upright walking

There is of course the obligatory evolutionary ‘junkie’ stories about what drove the increase in size of the large human brain (Harari admits to not knowing) and what led to upright walking, with stiff necks, backaches, and difficulties for women in childbirth the prices supposedly paid (pp. 9–11). It is said that only in the last 100,000 years (“with the rise of *Homo sapiens*”) did man do a “spectacular leap from the middle to the top” of the food chain (p. 12). The author then makes the following unjustifiable claim:

“Having so recently been one of the underdogs of the savannah, we are full of fears and anxieties over our position, which makes us doubly cruel and dangerous. Many historical calamities, from deadly wars to ecological catastrophes,

have resulted from this over-hasty jump” (p. 13).

Based on God’s Word, Christians believe that man’s problem is his sin nature, not some savannah hangover. Harari brings up the idea that “there is a direct link between the advent of cooking, the shortening of the human intestinal track”, and the growth of the “jumbo brains of Neandertals and Sapiens” (pp. 13–14). The decrease in energy consumption of the intestines supposedly paves the way for the growth of energy-guzzling large brains. I remember visiting the David H. Koch Hall of Human Origins at the Smithsonian National Museum of Natural History, Washington, DC, in 2013, and witnessing some museum guide deliver a similar tale to visitors. My opinion on the story has not changed, it was and remains an evolutionary fairy tale.

Out of Africa confusion

The author states that “most scientists agree that by 150,000 years ago, East Africa was populated by Sapiens that looked just like us”, and that “Scientists also agree that about 70,000 years ago, Sapiens from East Africa spread into the Arabian peninsula, and from there they quickly overran the entire Eurasian landmass” (p. 15). According to the Out of Africa theory, these Sapiens were then confronted by humans (e.g. Neandertals) that were already settled in most of Eurasia (p. 15). Two theories, the Interbreeding Theory and Replacement Theory, are then discussed in relation to the fate of these other humans, with the author seeming to prefer a Replacement Theory where “Neanderthals and Denisovans contributed only a small amount of DNA to our present-day genome” (p. 17).

Even from a strictly evolutionary viewpoint the above scenario appears obsolete based on recent studies. For

example, consider the finding of ‘early modern human’ (‘ancient *H. sapiens*’) mitochondrial DNA in a Neandertal bone (a femur) from Germany, dated by evolutionists to 124,000 years ago.⁴ According to them, it was the result of interbreeding with locals and ‘modern human ancestors’ who entered Europe more than 219,000 years ago. Hence, this is much earlier than the 70,000 years ago migration date suggested by Harari. Also, a *Homo sapiens* fossil skull from Jebel Irhoud, Morocco (figure 2) was recently re-dated by evolutionists from about 160,000 years ago to a much older 315,000 years ago,⁵ and so, from purely an evolutionary point of view, humans appeared much earlier in Africa than first thought, and it may not have been in East Africa that they first appeared. The above also indicates that the preferred Out of Africa theory of modern human origins is a chaotic mess.

Tree of Knowledge mutation

We are told that the “appearance of new ways of thinking and communicating, between 70,000 and 30,000 years ago, constitutes the



Figure 2: A cast of the Irhoud 1 *Homo sapiens* skull from Jebel Irhoud, Morocco, displayed at the Smithsonian National Museum of Natural History, Washington, DC. It was recently re-dated by evolutionists from about 160,000 years ago to a much older 315,000 years ago.

Cognitive Revolution” (p. 23). As to what caused this, the author admits to not being sure, but states:

“The most commonly believed theory argues that accidental genetic mutations changed the inner wiring of the brains of Sapiens, enabling them to think in unprecedented ways and to communicate using an altogether new type of language. We might call it the Tree of Knowledge mutation. Why did it occur in Sapiens DNA rather than in that of Neanderthals? It was a matter of pure chance, as far as we can tell” (pp. 23–24).

It is said that this “was not the first language”, nor was it “the first vocal language”, and that the most common answer as to what makes it special

“... is that our language is amazingly supple. We can connect a limited number of sounds and signs to produce an infinite number of sentences, each with a distinct meaning. We can thereby ingest, store and communicate a prodigious amount of information about the surrounding world” (p. 24).

The author sees the above theory, and the notion that “Our language evolved as a way of gossiping” (p. 25), as both valid, but believes the truly unique feature of our language is “the ability to transmit information about things that do not exist at all” (p. 27).

The cognitive revolution that never happened

Our language certainly is an amazing thing, making it even harder to believe it resulted from an accidental ‘Tree of Knowledge’ mutation. No mention is made of where the mutation (or mutations) occurred in the genome, or how many were involved. Of course, this is because the author does not have a clue, nor does anyone else for that matter, as this mutation event never occurred. One reason that makes it essentially impossible to occur is the waiting time problem, meaning that it takes

too long for specified DNA mutations to become fixed within a so-called hominin population.⁶ For example, to generate the anatomical changes necessary to make an australopithecine walk and run like a human would require a lot of precisely co-ordinated genetic mutations. In looking at the odds of it happening, Ann Gauger, an expert in developmental biology, concluded: “Given these numbers, it is extremely improbable, if not absolutely impossible, for us to have evolved from hominin ancestors by a gradual, unguided process.”⁷

The problem is even worse, as the genome has been deteriorating (due to accumulation of genetic mutations) ever since its origin, with the proposed evolutionary mechanism of natural selection sorting random mutations powerless to stop it.⁸ It has been conservatively estimated that in human reproductive cells the accumulation of mutations is at least 100 point mutations per person per generation.⁹ At this rate, in addition to evolution not being able to explain the arrival of information, it cannot explain the preservation of information over timespans of millions of years.

Regarding ‘archaic humans’ the author believes that “the invention of new technologies and the settlement of alien habitats resulted from genetic mutations and environmental pressures more than cultural initiatives” (p. 37). He states that “Two million years ago, genetic mutations resulted in the appearance of a new species called *Homo erectus*”, whose “emergence was accompanied by the development of a new stone technology”, but as “long as *Homo erectus* did not undergo further genetic alterations, its stone tools remained roughly the same—for close to 2 million years” (p. 37). The author then contrasts this with events since the Cognitive Revolution, brought about by the “Tree of Knowledge mutation” in *Homo sapiens* mentioned earlier, where

“Sapiens have been able to change their behaviour quickly, transmitting new behaviours to future generations without any need of genetic or environmental change” (p. 37). Whatever this supposed Tree of Knowledge mutation was, it seems to have given humans special powers, but as explained above, such mutations, including ones said to have given rise to *Homo erectus*, are essentially impossible. As such, the Cognitive Revolution, said to be “the point when history declared its independence from biology” (p. 41), never happened.

Evolutionary psychology

Harari pushes the idea of evolutionary psychologists, that to understand ourselves better, “we must get inside the heads of our hunter-gatherer ancestors” and “we need to delve into the hunter-gatherer world that shaped us, the world that we subconsciously still inhabit” (p. 45). He states, “Today we may be living in high-rise apartments with over-stuffed refrigerators, but our DNA still thinks we are in the savannah” (p. 46), and then mentions an evolutionary psychology theory that problems in modern marriages “all result from forcing humans to live in nuclear families and monogamous relationships that are incompatible with our biological software” (p. 47). However, he does mention that “Many scholars vehemently reject this theory” (p. 47). Of course, if human evolution never happened, then the assertions of evolutionary psychologists are little more than foolish psychobabble.

Into America dating problem

The author spends time discussing the hunter-gatherer way of life, and states that “Though they lived better lives than most people in agricultural and industrial societies, their world could still be harsh and unforgiving”

(p. 58). He mentions that the extinction of the Australian megafauna (more than 90% said to have disappeared 45,000 years ago) (p. 73) “was probably the first significant mark *Homo sapiens* left on our planet. It was followed by an even larger ecological disaster, this time in America. *Homo sapiens* was the first and only human species to reach the western hemisphere landmass, arriving about 16,000 years ago” (pp. 76–77). A recent study reported evidence of human activity in California about 130,000 years ago,¹⁰ and so if you accept evolutionary age dating methods, which I presume Harari does, then his date for human arrival in the Americas appears totally wrong.

Agricultural revolution

According to Harari “The transition to agriculture began around 9500–8500 BC in the hill country of south-eastern Turkey, western Iran and the Levant” (p. 87). He views the Agricultural Revolution as “history’s biggest fraud”, stating that it “left farmers with lives generally more difficult and less satisfying than those of foragers” (p. 90). The body of *Homo sapiens* is said to not have evolved for farming tasks, such as “clearing rocks and carrying water buckets”, but rather “was adapted to climbing apple trees and running after gazelles” (p. 91). However, from an evolutionary point of view, whose currency is said to be “neither hunger nor pain, but rather copies of DNA helixes”, the Agricultural Revolution was a success, as it kept “more people alive under worse conditions” (p. 94).

Again, the above claim can only plausibly be correct if evolution happened, which I believe is an impossibility for reasons mentioned above. As a creationist, I would dispute the early dates for the appearance of agriculture mentioned above, believing it was more recent, and would also

dispute the idea that hunter-gatherers existed for thousands of years before agriculture. Rather, I believe that as humans re-populated the earth after the Flood, in particular after the Babel dispersion, then out of necessity many of them had to adapt to a foraging lifestyle to survive until they settled down in some region. Some migrating people groups would have settled earlier than others, whilst some never settled at all. Books have been written on the dispersion of people across the earth after the Tower of Babel event.¹¹

Evolved differently

Harari admits that “Americans got the idea of equality from Christianity, which argues that every person has a divinely created soul, and that all souls are equal before God”, but rejecting Christianity, he asks “if we do not believe in the Christian myths about God, creation and souls, what does it mean that all people are ‘equal’?” (p. 122). Harari states that “There is only a blind evolutionary process, devoid of any purpose, leading to the birth of individuals” (p. 123), and his rejection of the Christian worldview is also evident in his discussion of the “most famous line of the American Declaration of Independence” (p. 122), which he translates into biological terms, as follows:

“We hold these truths to be self-evident, that all men evolved differently, that they are born with certain mutable characteristics, and that among these are life and the pursuit of pleasure” (p. 123).

He notes that:

“Advocates of equality and human rights may be outraged by this line of reasoning. Their response is likely to be ‘We know that people are not equal biologically! But if we believe that we are all equal in essence, it will enable us to create a stable and prosperous society.’ I have no argument with that. This is exactly what I mean by ‘imagined order’.

We believe in a particular order not because it is objectively true, but because believing in it enables us to cooperate effectively and forge a better society” (pp. 123–124).

The reasoning seems to be that, even though a certain view is wrong, it may be best for society if we nevertheless hold on to this belief (‘imagined order’). Christianity, as well as democracy and capitalism, are said by the author to be examples of imagined orders (ones that exist only in our minds) (pp. 126–127). Perhaps he should consider the possibility that belief in evolution is an ‘imagined order’—one detrimental to society.

The idea that “Evolution is based on difference, not equality” (p. 122), “that all men evolved differently” (p. 123), seems to open the door to beliefs that some people are superior than others, although the author denies there is evidence for this, later stating: “Between blacks and whites there are some objective biological differences, such as skin colour and hair type, but there is no evidence that the differences extend to intelligence or morality” (p. 152). Elsewhere he says that “the biological distinctions between different groups of *Homo sapiens* are, in fact, negligible” (p. 161). Such statements, regarding negligible biological differences between people groups, agree with the creationist position, but it seems a bit odd that this would be the case if indeed “all men evolved differently” (p. 123).

Evolutionary morality

Christian theology is blamed by the author for getting the concepts of ‘natural’ and ‘unnatural’ wrong, as “The theological meaning of ‘natural’ is ‘in accordance with the intentions of the God who created nature’” (p. 165). In Harari’s ideology God does not exist; there is only evolution without purpose (p. 165), and so to him “from a biological perspective, nothing is unnatural. Whatever is

possible is by definition also natural” (p. 164). He later states: “There is little sense, then, in arguing that the natural function of women is to give birth, or that homosexuality is unnatural. Most of the laws, norms, rights and obligations that define manhood and womanhood reflect human imagination more than biological reality” (p. 166). Earlier in the book the author calls “the biblical creation story, the Dreamtime myths of Australian Aboriginals, and the nationalist myths of modern states” common myths that we weave (p. 27). In discussing myths Harari states: “There are no gods in the universe, no nations, no money, no human rights, no laws and no justice outside the common imagination of human beings” (p. 31).

If you deny God exists, then the above is pretty much what you are left with, a universe void of moral absolutes. With evolutionary atheism, any moral code can only ever be relative, just a reflection of human imagination. In the end, any such moral code is meaningless anyhow, as evolution does not care about right and wrong, good and evil, natural and unnatural, there being no purpose to life, nor a higher authority who cares, or to whom we must give account. The good news is that God does exist, and instead the biggest so-called common myth woven is the evolutionary story.

Conclusion

A considerable portion of the book is spent superficially discussing a multitude of things, such as Buddhism, money, empires, humanism, capitalism, etc., that in terms of the creation vs evolution issue are arguably less relevant, and so were selectively left out to keep the review down to a reasonable length. In conclusion, as a Christian, I could not in good conscience recommend this book to anyone, as it is saturated in evolutionary and atheistic philosophy, and as a result gets many things wrong.

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Could we have evolved the image of God?

Human Origins and the Image of God: Essays in honor of J. Wentzel van Huyssteen

Christopher Lilley and Daniel J. Pedersen (Eds.)

Eerdmans, Grand Rapids, MI, 2017

Lita Cosner

In the academic discipline of theology, there is growing pressure for believing Christians to compromise their faith in all sorts of ways to be seen as sophisticated. To accept inerrancy, for example, is to assume the conclusion *a priori*, the argument goes, and so the sophisticated theologian will allow for and even assume errors great and small all throughout the text of Scripture. In place of the authority of Scripture, they accept the authority of whatever they believe the consensus of science to be. Because some (not all) still profess to be Christians, they must pay lip service to biblical ideas, but because Scripture is not their authority, they end up philosophizing on a foundation of sand.

Human Origins and the Image of God is a prime example of the sort of literature that is produced by these sorts of academics. Written in honour of Jacobus Wentzel van Huyssteen (b. 29 April 1942), the James I. McCord Professor of Theology and Science at Princeton Theological Seminary (1992–2014), who dedicated his career to reconciling evolution and Christian theology, it features essays from natural scientists, philosophers, historians, and theologians.

Many (though not all) authors in this volume demonstrate a mastery

of the dreadful sort of writing that puts words in their proper grammatical order, but successfully evades communicating any meaning. For instance, in this extended quote, an unbelieving archaeologist attempts to describe a theory of entanglement, which he describes as follows:

“I wish to suggest that religion originates in the human impulse to fix things. ... According to this view, humans and things are entangled with each other in various ways. Entanglement is the sum of human dependence on things, thing dependence on humans, thing dependence on other things, and human dependence on other humans. Within the central notion of dependence there are both reliance and constraint or dependency. Entanglements between humans and things afford agency, but they also entrap into specific pathways. Entanglement can thus also be defined as the product of a dialectical relationship between dependence and dependency. Put another way, humans and things get caught up in each other and push and pull each other in specific directions” (p. 44).

Such writing is beyond parody and beneath contempt, but is sadly popular among academic liberals, and this is not an isolated example from the book. (For instance, after reading through the chapter on axiological sensitivity twice, I still could not translate it into meaningful thought.)

The foundation of true knowledge

Some authors in this collection reason from the foundation of evolutionary biology or anthropology,

Human Origins and the Image of God

Essays in Honor of
J. Wentzel van Huyssteen



Christopher Lilley and Daniel J. Pedersen
editors

Foreword by M. Craig Barnes

others from the foundation of some sort of philosophy. What is lacking is anyone who reasons from the foundation of Scripture. So there is no reasoning that is properly Christian in the entire book. That it does not even make a pretence is odd for a book on a Christian topic.

Rather, the argumentation is founded on evolutionary presuppositions and postmodern interpretation. The effect is that the vast majority of the book has an ephemeral and forgettable quality, especially when paired with the meaningless jargon that makes up the majority of the book.

The image of God

This book purports to examine the concept of the image of God and how it might be interpreted in light of evolutionary theory. But it does not have a biblical definition of God, and therefore no biblical definition of the image of God. Several authors struggle to see the image of God as a unique quality of humans as distinct from animals. This is understandable given that they see humans as evolved from a common ancestor with other living things.

A refreshingly honest chapter

Michael Ruse's chapter, "Human Evolution: some tough questions for the Christian" was much more useful for a couple reasons. First, it addresses biblical teaching regarding origins and the inconsistencies of interpretations which try to incorporate evolution. Second, Ruse is a good communicator in writing and comes across much more straightforwardly.

Ruse, like the other authors, accepts the evolutionary narrative of the origins of the universe and humanity. (He has a decades-long history of anti-creationist activism and writing.) He characterizes the Christian belief that he addresses as follows:

"A creator god exists and this god is all loving and all powerful. Humans are made in the image of this god (whom I will now capitalize as 'God'), meaning that we have intelligence and a moral sense and free will in some sense to go with this. We are tainted by original sin, and Jesus who is one substance with God, came to Earth and died on the cross for our salvation. We have therefore the real possibility of eternal life. We are expected to behave properly, but doing good in itself could never be enough. For that, we need Jesus. The Bible is the revealed word of God, true throughout; but it has long been recognized (at least since Augustine) that it often needs to be understood metaphorically or allegorically. It is not a work of science" (p. 157).

That one of the unbelievers should give the plainest and best overview of what Christian faith entails in the book should be shameful to those who presumably claim some sort of Christian faith (though of course we would take issue with allegorical interpretation—Augustine himself was a young-earth creationist).

Ruse points out that a historical Adam and Eve are indispensable for a Christian doctrine of original sin, and evolution has no place for a literal first couple who were the special creations of God. "It just won't do to say that one day God put immortal souls in a pair of hominins and that did the job. Either every member of the species was made in the image of God, or none was" (p. 158). He believes that it is impossible to salvage the doctrine of Original Sin in light of the 'fact' of evolution, but proposes a solution.

"With the removal of Adam and Eve, you are not pushed to saying that we are not sinful. We are. You are pushed to saying that sin is part of human nature, part of the way in which we developed, and should not be pinned down on one dope a long time ago" (p. 159).

But just as the sinful parts of our nature are the fault of evolution, according to this way of thinking, Ruse argues that there is a positive side to selection, in that we evolved to cooperate with each other and to be altruistic. "Hence, I would suggest that claims made in the name of Christianity about us being irredeemably corrupt are simply hogwash" (p. 160). Ruse credits this cooperation to sexual selection, and somehow the fact that women are as important in the process of sexual selection as men causes him to make the leap to arguing for female clergy.

"You can keep going with all-male pastors and priests. But if nothing else, it starts to suggest that there is something unnatural about keeping women in subservient roles God has made things to function, to work naturally, and it is our obligation to go with what God designs and wants. If God made women equal to men, then who are we to give them subservient roles?" (p. 162).

But if life on Earth developed through evolution, are humans a mere fluke, or were we necessarily a part of God's plan for the world? Ruse rejects a scenario where God overtly influences

the process of evolution in such a way as to ensure human beings.

"The trouble with this is first, as Darwin grumbled, you really are taking the matter out of science. . . . Second, there is no empirical evidence for such direction Third, theologically, once you bring God into the business on a daily basis, then you are open to questions about why God doesn't do a bit more. Why doesn't he correct mutations that are going to lead to horrendous effects like many genetic diseases?" (pp. 164–165).

Some evolutionists argue that humans or something like them would have almost inevitably emerged as a result of the 'arms race' of natural selection. But Ruse points out that there are innumerable contingencies involved and the evolution of humans was by no means a necessary outcome. He eventually settles on the multiverse as a possible solution.

Of course Ruse comes at the question from an evolutionist, non-Christian stance, and Christian biblical creationists would completely disagree with him regarding nearly every assertion he makes in his essay. But at least he presented his arguments clearly, and had more regard for the Bible in his interactions with Christianity than any of the other writers. If the entire book had been written along these lines, creationists would still have disagreed with it, but it might have been more useful as an example of what we could answer in our work. Or, as the great physicist Wolfgang Pauli might have said, Ruse wasn't right, but the other authors were not even wrong.

Reasoning from foundations of sand

None of the authors succeed in discussing the image of God, because none of them really believe in God, and none of them believe that humans are

created in His image. So one wonders why they bothered.

So why should biblical creationists care about a bunch of mostly postmodern academics they've never heard of writing in celebration of another postmodern academic they've never heard of? Well, it's useful to know that these sorts of conversations about very important theological concepts are going on, so that we're not blindsided when some atheist brings them up. But that doesn't make them less of a chore to read. It also alerts readers to the state of theological education in the most 'prestigious' seminaries, so we can avoid sending students there.

The big picture: really?'

The Big Picture: On the origins of life, meaning, and the universe itself

Sean Carroll

Oneworld Publications, London, 2016

John G. Hartnett

Sean M. Carroll is a theoretical physicist at the California Institute of Technology, and an outspoken atheist (not to be confused with Sean B. Carroll, an evolutionary biologist). The book was the winner of the 2013 Royal Society Winton Prize for Science Books.

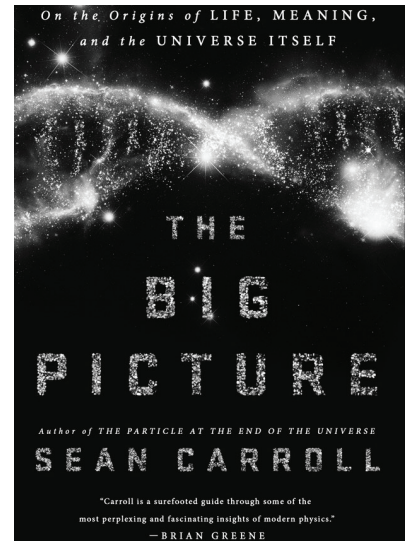
Overview

On the inside book cover these questions are written:

"Where are we? Who are we? Do our beliefs, hopes and dreams mean anything out there in the void? Can human purpose and meaning ever fit into a scientific worldview?"

Carroll's message in this book is that there is no ultimate purpose, we are only the product of matter and material forces, there is no meaning to life, there is no afterlife and meaning and purpose do not fit into any scientific worldview. But the author tries to dress it up, saying that it's what you put into your life that counts. Beauty is found in the observer. But he cannot escape his own bondage because his worldview ultimately does not allow for intrinsic meaning or purpose. He is just dead in the end.

There is nothing new in this book but a lot of atheistic philosophy stemming from Enlightenment philosopher David Hume. The author uses circular reasoning and begging the question. By



assuming there is no Creator because He is not needed in the universe, to cause it or operate within it, and by assuming everything in the past evolution of the universe, and life in it, is explained by man's current knowledge (Darwinian evolution by mutation and natural selection), then everything can be explained as to how it came to be. The universe needs no reason to exist. It simply is. Life needs no reason, it simply is.

There was nothing before time began in the big bang so no question can be asked about what was before. There is no First Cause because either the universe came into the existence with the beginning of time itself, or, time is fundamental and always existed, so that from it and the laws of physics the universe spontaneously arose from some quantum fluctuation. *Now that we are smarter we have come to understand this true fact.*

He talks of *methodological empiricism* as the correct way to learn the truth about the universe but he offers no direct empirical evidence for the origin of the universe in a big bang, or for the initial alleged low-entropy state

it started in, or for the spontaneous origin of life by random chance, or for the alleged Darwinian evolution of living organisms by natural selection over eons of history. We are essentially asked to just believe these as given facts as much as the author seems to. Only he offers up stories to justify his beliefs. As a book alleged to give the big picture of the universe and all life in it, it fails on the very premise the author sets out to use—*direct observation of the world to discover the truth*. Also, right at the foundation, his claim is self-refuting: what empirical evidence showed that empiricism is the correct way to learn the truth?

To the best of my knowledge, and I read every word of the book, nowhere in this book is Jesus Christ mentioned. God is mentioned but never the name of Jesus. In terms of being an influential thinker, Jesus Christ is probably the single most influential. Considering that, then in a book ostensibly on the meaning of life and the universe, you would think He would merit a mention.

Goals of the book

In the prologue the author writes:

“We have two goals ahead of us. One is to explain the story of our universe and why we think it’s true, the big picture as we currently understand it. It’s a fantastic conception. We humans are blobs of organised mud, which through the impersonal workings of nature’s patterns have developed the capacity to contemplate and cherish and engage with the intimidating complexity of the world around us. To understand ourselves, we have to understand the stuff out of which we are made, which means we have to dig deeply into the realm of particles and forces and quantum phenomena, not to mention the spectacular variety of ways that

those microscopic pieces can come together to form organized systems capable of feeling and thought.

“The other goal is to offer a bit of existential therapy. ... By the old way of thinking, human life couldn’t possibly be meaningful if we are ‘just’ collections of atoms moving around in accordance with the laws of physics. That’s exactly what we are, but it’s not the *only* way of thinking about what we are. We are collections of atoms, operating independently of any immaterial spirits or influences, *and* we are thinking and feeling people who bring meaning into existence by the way we live our lives” (p. 3).

The latter he has to say because later he talks about the material world as all there is. There is no such thing as a spirit or a soul that is not part of our material body. When we die that is it, there is nothing beyond life.

Carroll is a student of many philosophers, mostly atheists, or who are at least those who challenge a conservative worldview of life. For example he mentions, Descartes, Nietzsche, Laplace, Hume, Leibniz, Spinoza, Lewis (not C.S. Lewis), Russell, Wittgenstein, Kierkegaard and others. But it would seem that the author relies more strongly on the so-called ‘enlightenment’ philosophy of the Scotsman David Hume (figure 1).

His claim is that the ‘core theory’—the standard quantum field theory of particle physics—is the correct theory to describe everything in the realm of human existence.

“... we have extremely good reason to think that the Core Theory is the correct description of nature in its domain of applicability. That domain is wide enough to immediately exclude a number of provocative phenomena: from telekinesis and astrology to survival of the soul after death” (p. 4).

The existence of the soul is lumped in with pseudo-sciences such as astrology and telekinesis. That seems to show his ignorance of what real biblical Christians actually believe. It is disingenuous, in my view, to lump the survival of the soul after death in with various parapsychological beliefs, which would be condemned by God.

He is a believer in materialism at its very core, and as such promotes naturalism, in a form he calls *poetic naturalism*, which he says is from David Hume. In that, apparently, we can find a meaning for life.

“Purpose and meaning of life arise through fundamentally human acts of creation, rather than being derived from anything outside ourselves” (p. 11).

He states his religion clearly, which he attempts to justify in the book:

“In the right circumstances, matter self-organizes into configurations, capable of capturing and using information from their environments. The culmination of this process is life itself” (pp. 4–5). “At a fundamental level, there aren’t separate ‘living things’ and ‘nonliving things’, ‘things here on Earth’ and ‘things up in the sky’, ‘matter’ and ‘spirit’. There is just the basic stuff of reality, appearing to us in many different forms” (p. 12).

The overall thread of his book describes how mankind has become more and more knowledgeable of how nature operates and, as such, we no longer need to think in terms of anything other than a material world. There is nothing else—nothing else is needed to explain everything we know. There are no gods, no creator, no spirits, and no soul. All is matter and the way the laws of physics operate on that matter.

The book is divided into six sections: they are titled Cosmos, Understanding, Essence, Complexity, Thinking, and the last section is Caring:

“Finally, in ‘Caring’ we confront the hardest problem of all, that of how to construct meaning and values in a cosmos without transcendent purpose. ... Poetic naturalism [the form he subscribes to] strikes a middle ground, accepting that values are human constructs, but denying that they are therefore illusory or meaningless. ... The meaning we find in life is not transcendent, but it’s no less meaningful for that” (p. 5).

He tries to hold the view that there can be found excitement and meaning in life whilst knowing on the other hand that there is no ultimate purpose: “As we understand the world better, the idea that it has a transcendent purpose seems increasingly untenable” (p. 9). And he says the problem occurs because we have not fully accepted this view of life:

“Over the course of the last two centuries, Darwin has upended our view of life” (p. 10).

“It’s a bit of a leap, in the face of all of our commonsense experience, to think that life can simply start up out of non-life, or that our experience of consciousness needs no more ingredients than atoms obeying the laws of physics. Of equal importance, appeals to transcendent purpose or higher power seem to provide answers to questions to some of the pressing ‘Why?’ questions we humans like to ask: Why this universe? Why am I here? Why anything at all? Naturalism, by contrast, simply says: those aren’t the right questions to ask” (p. 13).

And he admits that “It’s a lot to swallow, and not a view that anyone should accept unquestioningly”, and “We don’t know how the universe began, or if it’s the only universe. ... We don’t know how life began, or how consciousness arose.”

If you don’t know how, then probably you don’t know why. So how can he answer the ‘big picture’ questions when within the first

13 pages he has admitted that the naturalists have no idea and instead says that such ‘why?’ questions are invalid?

Naturalism

He defines naturalism, saying it comes down to three things (p. 20) and that “*the only reliable way of learning about the world is by observing it*”. But how can he know that if he is not God? Suppose for a minute that there really is a Creator God and He gave us a revelation in His written Word. But because man cannot, by definition, observe God, since He is a spirit and outside the realm of detectability by science, how can he know that what God has written is not a reliable way of learning about the world? And this is another self-refuting claim: what observation did he make, or even could he make, that reliably showed that observation is the only reliable way of learning?

His form of naturalism—poetic naturalism (after David Hume)—is just normal atheistic naturalism, but he adds that man has responsibility and freedom (p. 21): “The world exists; beauty and goodness are things that we bring to it.” He means there is nothing intrinsically good or beautiful. He writes that there are “No causes,

whether material, formal, efficient, or final” (p. 29).

In the chapter titled “Time’s Arrow” he states that the arrow of time seen in human ageing and in the evolution of the big bang universe are ‘intimately related’:

“The reason why we are all born young and die older; the reason why we can make choices about what to do next but not about things we’ve already done; the reason why we remember the past and not the future—all of these can ultimately be traced to the evolution of the wider universe, and in particular to conditions near its very beginning, 14 billion years ago at the Big Bang” (p. 54).

“The reason why there’s a noticeable distinction between past and future isn’t because of the nature of time; it’s because we live in the aftermath of an extremely influential event: the Big Bang” (p. 55).

The notion of purpose is discarded in favour of just everything that happens, including ageing and our memories, are the result of the big bang. It reads like worship of the big bang. It is the reason for our existence and must be given due credit, even for time itself.

He discusses the special condition that the universe allegedly started in, that is in a low state of entropy from which entropy (or disorder) increased as a function of time. He states that this gave rise to the well-known ‘thermodynamic’ arrow of time. Later he credits this initial low-entropy state and subsequent progression of expansion and increasing entropy as the cause for growth in complexity and even life.

He describes how life may have begun and offers the usual experiments and speculations, including the Miller–Urey experiment. He describes scenarios for the origin of the first living things in terms of a cell membrane, metabolism, and reproduction, which requires an

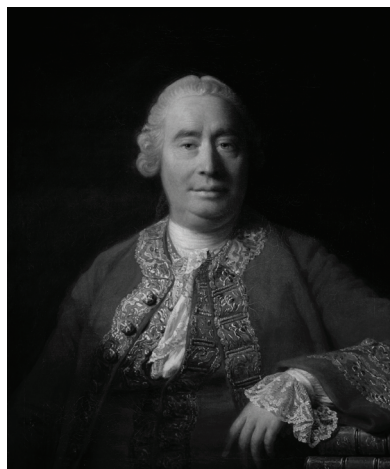


Figure 1. David Hume (Allan Ramsay, 1766)

information storage system. He offers up the usual *RNA World* scenarios.

But because he has nothing to offer as real direct observational evidence of novel structures spontaneously forming in an organism he has to write this:

“We’ve *speculated* that DNA came from RNA, which in turn *may have* self-catalyzed its own production under the right circumstances. *It’s possible* that the creation of the first RNA molecule involved random fluctuations at critical points along the way. Boltzmann taught us that entropy *usually increases*, but *there is always some probability* that it will occasionally move downward [emphases added]” (p. 275).

It comes down to speculation and storytelling, not science.

Eventually his thesis gets into complexity of the brain and consciousness, but admits that modern science has not a lot to say yet about understanding the origin of consciousness. Philosophically and scientifically he is convinced that the soul does not exist apart from matter. And as a result, consciousness is merely a product of the brain, which ceases to exist when the body dies.

He advocates living your life believing that there is nothing beyond the grave. And because he says there is no creator, he offers his own 10 considerations (in contrast to God’s 10 Commandments):

1. Life isn’t forever.
2. Desire is built into life.
3. What matters is what matters to people.
4. We can always do better.
5. It pays to listen.
6. There is no natural way to be.
7. It takes all kinds.
8. The universe is in our hands.
9. We can do better than happiness.
10. Reality guides us.

He comes out with typical man-can-solve-his-own-problems statements: “It’s up to us to make wise choices and shape the world to be a better place”

(p. 426). But we should come to the realisation that there is nothing else: “Illusions can be pleasant, but the rewards of truth are enormously greater” (p. 427). This is a reference to those who think that there is more to life than matter—there isn’t and once you wake up to the truth you can make your life better.

Life is just a product of this universe, and its special, low-entropy initial state. Everything flows from that and our current scientific knowledge indicates that there is nothing more than the material existence. There is no God, no soul, no life after death, and ultimately there is no purpose. The only purpose is what you make of your own life.

Relevance

In the last chapter, the author describes his own Christian experience of attending an Episcopal church—a “brand of Episcopalianism ... as mellow as churchgoing gets”. There he describes his transformation from being a ‘casual believer’ to naturalism.

He writes of two incidents that converted him. One was his realisation that the liturgy of his church was not decided by God when it was rearranged so that there was less standing and kneeling. Yet he says at that point he was still a believer. Then he attended a Catholic University as an undergraduate astronomy major. From that education he understood how the universe worked, presumably being taught from a big bang, evolution worldview and not from a biblical creation perspective. Such Catholic education is atheistic at its core. The only difference is they teach Roman Catholic theology and ethics.

But from his own writings, it is clear that Carroll never knew Jesus Christ as his Lord and Saviour. He never understood what Christ had done on the cross nor its links to the events of the historical creation

account in the Garden of Eden. He was a professing believer *in name only* who gave up that label after he heard a song with an atheist message: “Don’t need the word/Now that you’ve heard/Don’t be afraid/Man is man-made.” From that time on, he claims that he realised it was okay to be a non-believer.

The irony is two-fold. One, he never believed as a real Christian—a transformed life in Christ. Maybe he believed on the level of believing some story as history. (I even know, first hand, an atheist who calls himself a Christian—culturally he sees himself that way.) Secondly, Carroll now thinks he is a non-believer, but actually he just shifted his faith, such as it was, over to another belief system. And that belief system is squarely where Satan would have the whole world. If he can get you to believe that the universe created itself, then he can get you to deny Christ and the One who died for the sins of the world.

But this story highlights the importance of teaching our children and students the whole truth about big bang cosmic evolution, abiogenesis (naturalistic origin of life from chemicals) and Darwinian evolution, the goo-to-you type that allegedly built microbiologists out of microbes over 4 billion years.

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Documenting fake history against the Catholic Church

Bearing False Witness: Debunking centuries of anti-Catholic history

Rodney Stark

Templeton Press, West Conshohocken, PA, 2016

Michael J. Oard

Rewriting history is not just a twentieth-century phenomenon. Myths created by the culture with an agenda have inadvertently been accepted as fact by our general culture. Much of this myth making has been directed toward the Catholic Church, but the lies also cast a dark light on all Christians.

Dr Rodney Stark exposes the myths in *Bearing False Witness*. Stark is a distinguished professor of social sciences and co-director of the Institute for Studies of Religion at Baylor University and honorary professor of sociology at Peking University in Beijing. For 32 years he was a Professor of Sociology and Comparative Religion at the University of Washington, my alma mater. Stark has published numerous books and research articles, including such notable books, correcting history, as *How the West Won*,¹ *For the Glory of God*,² *The Victory of Reason*,³ and *God's Battalions*.⁴ Before doing his research, Dr Stark had also believed most of the myths. Although Stark is not a Catholic (and neither am I, nor is CMI), his love for truth compelled him to gather facts from original sources and authors that studied them. What he found surprised and saddened him, as it will the reader.

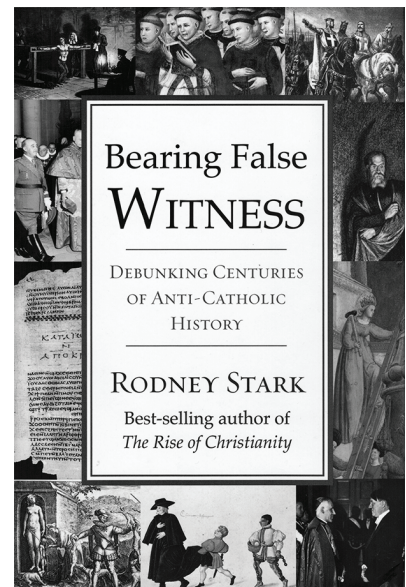
The flat earth

Stark begins his introduction by exposing probably the most egregious distortion of history that continues to be widely taught in the culture. The myth accuses the Catholic hierarchy of trying to persuade Columbus not to make his historic voyage because the earth was flat. Stark does not mince words when he says this lie was invented to make Catholics look bad (and was then often thrown at Protestants as well). The truth is, at the time of Columbus, no-one in recorded history had believed the earth was flat, and all theologians and scholars who had commented on the issue had affirmed that Earth was a globe. Rather, the scholars contended with Columbus because they (rightly!) believed the distance to Japan was much greater than Columbus had claimed. At that time they had a reasonable estimate of the circumference of the earth. They were correct about the distance Columbus's crew had to sail to reach Japan, but they did not know the discovery of the Americas would save them from starvation.

The flat earth myth was invented and propagated by anti-Christians in the 1800s, especially by Washington Irving in his 1828 biography of Columbus. The story has been eagerly endorsed by historians until recently. The myth was especially exposed by the work of distinguished medieval historian Jeffrey Burton Russell.⁵ The flat earth myth is still used by anti-Christians today to cast aspersions on creationists (figure 1).

Anti-Semitism and Hitler's pope

Stark next turns to the charge that the Catholic Church originated anti-Semitism and that Pope Pius XII was



Hitler's pope. The Catholic Church is blamed for anti-Semitism because before the Crusades there was said to have been a general peace between Jews and the culture. At the start of the Crusades in AD 1096, a small number of renegade crusaders attacked and killed Jews in Europe, especially in the Rhineland. The crusaders were highly motivated by religious fervour, but ignorant. They believed they were fighting the infidels who killed Christ when they killed the Jews. Ever since then, ignorant people, including professing Christians, have taken words in the New Testament⁶ out of context as justification for anti-Semitism.

The truth, as Stark shows, is that anti-Semitism has existed since before the time of Christ—the Old Testament is not the only place where this is documented. It is more a product of culture than religion. Most of the early persecution of the Jews occurred in the Rhineland. Throughout history this area has been difficult to govern. History also shows that Jews have persecuted Christians.

Another myth Stark debunks is the portrayal of the Muslims of Spain as a shining example of tolerance of the Jews. The historical record proves numerous Church clergy went out of their way to protect the Jews (against

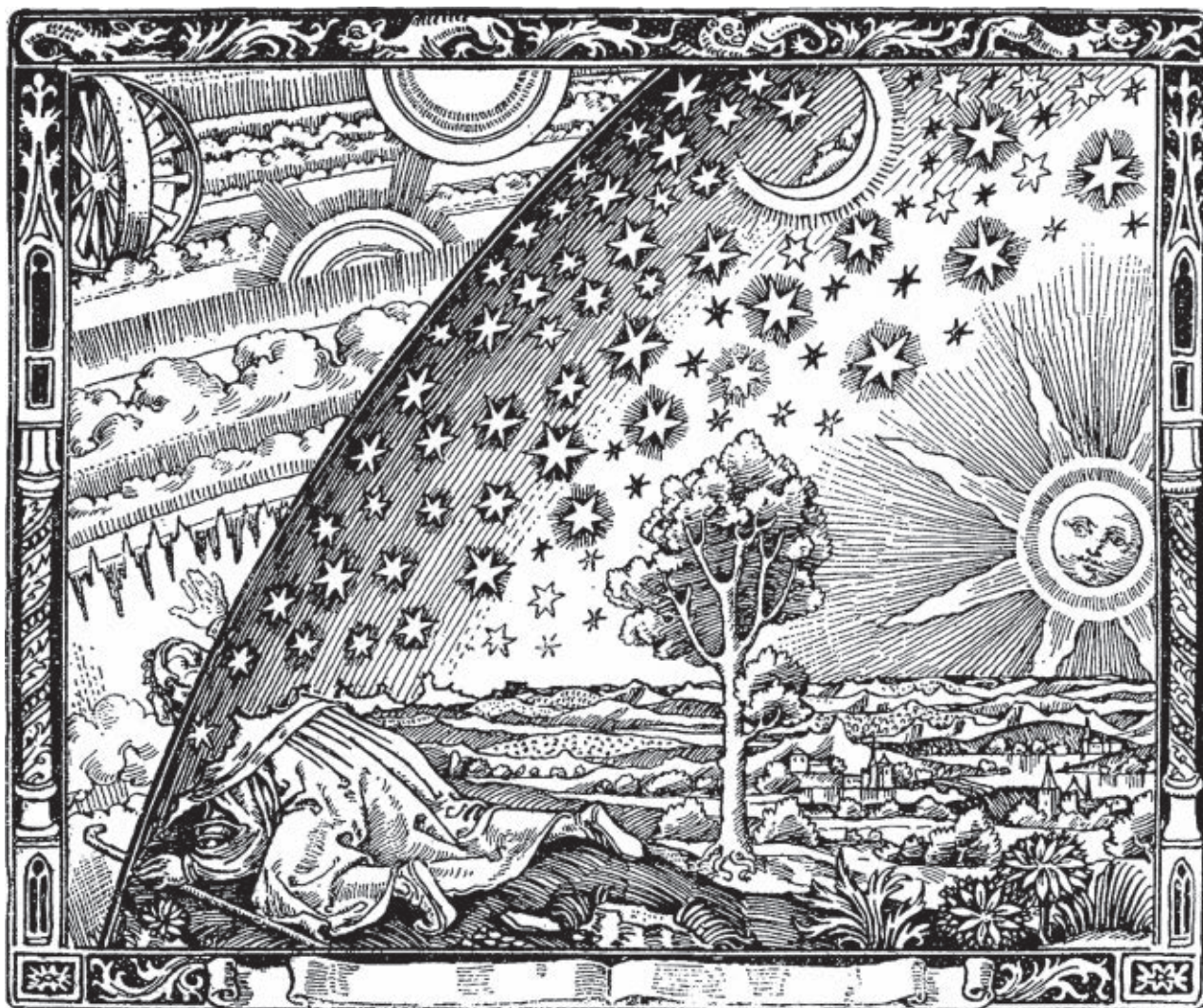


Figure 1. The Flammarion engraving (1888) depicts a traveller who arrives at the edge of a flat earth and sticks his head through the firmament.

the Spanish Muslims), even during the time of the Crusades. The 12th-century papal bull *Sicut Judaeis* (Latin: ‘As the Jews’) forbade, with a penalty of excommunication, any murder, bullying, robbing, or forced conversion of Jews. This bull was repeatedly reaffirmed by medieval popes. The example of Bernard of Clairvaux is especially inspiring.

A more modern false claim by Church critics is that Pope Pius XII was Hitler’s pope during World War II. This is a total fabrication, which is countered by Jewish authors’ interviews of survivors protected by the pope, and the wide admiration by

the founders of Israel. The moniker ‘Hitler’s pope’ was invented by the Soviet Union to neutralize the Vatican’s influence in post-war affairs.

The lie was mostly put to rest after the war but was revived in modern times by John Cornwell’s popular book *Hitler’s Pope: The Secret History of Pius XII*, published in 1999. His book was an attempt to push the church towards liberal theology. It is amazing how many liberals believed it, without checking the facts. But a host of historians have shown how fictitious Cornwell’s charges are. Pope Pius XII vigorously spoke out against Hitler and racism during the 1930s, and he

and other clergy, whom he influenced, hid thousands of Jews during World War II. The pope and his influence probably saved hundreds of thousands of Jews.⁷

Suppressing the ‘truth’ about Jesus

Another false charge is that the Catholic Church suppressed other gospels and kept only the ones they wanted, the ones in the New Testament, for propaganda purposes. These ‘gospels’ that have recently been unearthed include *The Secret Gospel of Thomas*, *The Gospel of Mary*, *The*

Secret Book of John, and *The Gospel of Judas*. The influence of these books produced *The Da Vinci Code*, a supposedly “bitter indictment of a Roman Catholic conspiracy to suppress the truth about Jesus” (p. 51).

It is amazing how easily people can be deceived, including university professors. The late Robert Funk, founder of the famous Jesus Seminar in which the participants actually ‘voted’ on the ‘true’ words of Jesus stated that these new gospels make it “no longer credible to think of Jesus as divine ... [that belief] is sub-rational and sub-ethical ... Jesus did not rise from the dead except perhaps in some metaphorical sense” (p. 38).

These ‘gospels’ were not lost but were well known to the early Church Fathers,⁸ especially by Irenaeus (115–c. 202), bishop of Lyon, who wrote *Against Heresies*. He refuted the heresies in these alternate gospels. They were written by the gnostics in the first few centuries after Christ. The gnostics believed they had secret knowledge that was only for certain elites. These gospels were not so much suppressed but unmasked as obvious forgeries, being written well after the time of Jesus and the Apostles, and completely inconsistent with Hebrew Scripture and all of the writings of Paul and the eye witness of Jesus. It goes to show that many people will believe what they want to believe with little or no regard for the truth.

Persecuting the tolerant pagans

It is typical that regimes that rise to power often suppress those who disagree with them. So, it is widely claimed that when Constantine (317–337) became a Christian and the Catholic Church became dominant they persecuted those who believed in the Greek and Roman gods, in other words the ‘pagans’, who were ‘tolerant’. This myth was invented by the so-called Enlightenment to

spread lies about the Catholic Church, especially by Edward Gibbon and Voltaire, both virulent anti-Christians.

In reality, history records pagans persecuted the Christians. The last pagan emperor, Julian the Apostate (361–363), tried to restore paganism and persecuted Christians. Moreover, pagans persisted in good health within the Roman culture. Even Constantine, and later Roman Emperors, who claimed to be Christians, regularly hired pagans as Consuls and Prefects (see table on page 58). Constantine’s writings indicate that he supported peaceful coexistence and pluralism. For a long time after Constantine, the Church was more interested in stopping heresies than in persecuting pagans. History shows that the influence of paganism did wane, partly because the Catholic Church assimilated certain aspects of paganism, such as Christianizing pagan holidays. Stark summarizes:

“Nevertheless, the Church did not exploit its official standing to quickly stamp out paganism, nor did the emperors accomplish this on behalf of the new faith. Instead,

paganism survived relatively unmolested for centuries after the conversion of Constantine, only slowly sinking into obscurity, meanwhile managing to create niches for some of its traditions within Christianity” (p. 71).

The church is responsible for the ‘Dark Ages’

Another myth that is widely believed by the culture, as well as Christians, is that once Constantine became a Christian, around 300, the Dark Ages descended upon the world (figure 2). Daniel Boorstin (1914–2004), onetime professor of the University of Chicago, declared: “The leaders of orthodox Christendom built a grand barrier against the progress of knowledge” (p. 73). Bertrand Russell (1872–1970) lent his considerable cultural authority by railing: “As the central authority of Rome decayed, the lands of the Western Empire began to sink into an era of barbarism during which Europe suffered a general cultural decline” (p. 74).



Figure 2. The ‘Dark Ages’ remind some people of the 1562 painting by Pieter Bruegel the Elder called *The Triumph of Death* (Museo del Prado), which shows a panorama of an army of skeletons wreaking destruction across a scorched, barren earth.

According to this myth, the Dark Ages supposedly began around 300 to 500 and ended in the 1500s with the ‘Renaissance’, which then led to the ‘Enlightenment’ in the 1700s. The ‘Renaissance’, meaning ‘rebirth’, was claimed to be the ‘rediscovery’ of the ‘long forgotten’ classical learning of Greece and Rome, which brought light against the prevailing intellectual darkness of the Christian worldview. Thus, according to the story, the ‘Age of Reason’ took over and continues brightly to this day.

History shows a completely different picture. The so-called barbarians that sacked Rome in 410 were Goths, who were not barbarians. Their commander, Alaric, was an ex-Roman commander, and the majority of his troops were ex-Roman soldiers. Rome was not the capital at the time and Romans lived all across the empire. They did not suddenly become dark in 410, or in 300 for that matter. There were no dark ages. Technology, especially in the areas of agriculture and engineering, greatly improved the way of life for Europeans during the so-called Dark Ages. Stark states:

“In part, the notion that Europe fell into the ‘Dark Ages’ was a hoax perpetrated by very antireligious intellectuals such as Voltaire and Gibbon, who were determined to claim that theirs was the era of ‘Enlightenment’” (p. 76).

Actually, a strong case can be made that once the authority of Rome, which was anti-development, weakened, progress blossomed. There was also remarkable moral progress in that slavery, which was common during the Roman era, was extinguished by the Christianized culture during the ‘Dark Ages’, as Stark elegantly states:

“All classical societies were slave societies. In fact, all known societies above the very primitive level have been slave societies—even many of the northwest [USA] Indian tribes had slaves long before Columbus’s voyage. Amid this universal slavery, only

one civilization ever rejected human bondage: Christendom. And it did it twice!” (p. 81)

Progress was also made in ‘high culture’ with enormous advances in music, art, literature, architecture, education, and science.¹ Moreover, the so-called classics of Greece and Rome were not lost, but had been studied, and challenged, for centuries at universities that, incidentally, were started by Christians. The first university was established in 1088 in Bologna, northern Italy. Later, in 1150, the University of Paris was established and many others after that.

The myths of the ‘Renaissance’, the ‘Enlightenment’, and the ‘Age of Reason’

So, the ‘Renaissance’ itself is a myth—there was progress before, during, and after that period. The ‘Enlightenment’ and the ‘Age of Reason’ are also myths, propagated by very anti-religious literary scholars, as Stark explains:

“What the proponents of the Enlightenment actually initiated was the tradition of angry secular attacks on religion in the name of science—attacks like those of their modern counterparts such as Carl Sagan, Daniel Dennett, and Richard Dawkins. Presented as the latest word in sophistication, rationalism, and reason, these assaults are remarkably naïve—both then and now. In truth, the rise of science was inseparable from Christian theology, for the latter gave direction and confidence to the former” (pp. 87–88).

Stark makes a point that these early purveyors of Enlightenment contributed very little to the advancement of knowledge. If the French revolution which started in 1789, is a guide, they fomented a rebellion that resulted in terrible brutality. Stark concludes:

“When one examines the conventional outline of Western history, one encounters some truly fabulous

inventions. These were not invented by the Church but by secular intellectuals, who coined the Dark Ages, the Renaissance, the Enlightenment, and the Age of Reason. These were great historical eras that never really happened” (p. 91).

The Crusade myths

The Crusades began in 1096 with the first Crusade and ended about two centuries later. Although they were brutal and chaotic, much of what is taught in our culture about the Crusades is mostly mythological.⁴ It is claimed that the Crusades were motivated by greed—a quest for land, loot, and converts—and left an enlightened, tolerant, and peaceful Islam in ruins. The Western condemnations of the Crusades originated with the so-called Enlightenment—of course. Voltaire wrote that the Crusades were an

“... epidemic of fury which lasted for two hundred years and which was always marked by every cruelty, every perfidy, every debauchery, and every folly of which human nature is capable” (p. 95).

The venom continues today, but the truth of this unfortunate era has been lost in the polemics.

The Muslims had been aggressively conquering portions of Europe, the Middle East, northern Africa, and Spain for four hundred years before the Crusades began. The march on Europe was stopped in what is now France by Charles Martel in 732, at the Battle of Tours (Poitiers). The Crusades were primarily defensive. The First Crusade was a response to centuries of brutality, where Muslim armies ravaged most of the centres of early Christianity and forced conversion to Islam.

The rallying point came when pilgrims to the Holy Land reported murder and crime against them by the Muslims. This, coupled with a cry for help by Alexius Comnenus, emperor of Byzantium, to Pope Urban II moved him to action. The Crusades

cost the lives and fortunes of many who answered his call. The goal was to liberate the Holy Land from Muslim control. The First Crusade was successful in recapturing Jerusalem in 1099 at a very high cost and against all odds. It is claimed that the Crusades initiated a great massacre of the inhabitants of Jerusalem, which may or may not be true. But we are judging the time from our own cultural perspective. Both sides in a war tended to massacre those captured for revenge and to prevent further uprisings. Very little is written on the Muslim massacres, which were many, including those perpetrated by the Muslim 'hero', Saladin. In fact, the single greatest massacre during the Crusade was by Baybars, sultan of Egypt, when he recaptured the city of Antioch.

Once the Holy Land had been recaptured, two knightly orders of the Catholic Church were formed to secure it against constant Muslim attacks. These orders initially had ideal purposes but became corrupted over time. The Knights Hospitaller were initially founded to care for sick Christian pilgrims travelling to the Holy Land, and the Knights Templar originated as a military order to protect pilgrims. The Crusaders and Knights made no attempt to convert Muslims, as widely charged by the culture.

Although the Catholic Church had fairly honourable goals during the First Crusade, the subsequent Crusades were less honourable and more political. They descended into chaos with many Crusader defeats. The popes used plenary indulgences, forgiveness of all sins, and promises of an automatic trip to heaven, to induce people to go on the Crusades. The Church hoped to serve a dual purpose with the Crusades and that was to unify the contentious knights of Europe into one 'holy' cause. I will let Stark summarize:

"The Crusades were not unprovoked. They were not the first round of European colonialism. They were not conducted for land, loot, or converts.

The Crusaders were not barbarians who victimized the cultivated Muslims" (p. 115).

The Inquisition exaggerations

Surely, the Inquisition shows the true colours of Christianity. However, this is another cultural myth. The Inquisition, especially the Spanish Inquisition, generally brings up images of torture, death, and suffering inflicted on millions of innocent people by the Catholic Church. It is universally condemned by the culture. Popular historian Will Durant (1885–1981) was typical when he said: "we must rank the Inquisition ... among the darkest blots on the record of mankind, revealing a ferocity unknown in any beast" (p. 118). However, history shows a different picture, especially thanks to secret archives of many of the Inquisition proceedings made available to historians. Almost all of what is popularly believed is untrue. Stark calls the standard account of the Spanish Inquisition as mostly a 'pack of lies':

"But there is no such excuse for the irresponsible contemporary 'scholars' who continue to support such claims while ignoring the remarkable research on the Inquisition that has been accomplished in the past generation. Astonishing as it may seem, the new historians of the Inquisition have revealed that, in contrast with the secular courts all across Europe, the Spanish Inquisition was a consistent force for justice, restraint, due process, and enlightenment" (p. 119).

The Spanish Inquisition was started during the so-called Renaissance by the 'Catholic Monarchs' (the husband-and-wife team) Ferdinand II of Aragon and Isabella I of Castille in 1478. It was actually a moderating force against the excesses of the countries of Europe commonly ruled by brutal dictators that severely punished those of different Christian denominations.

The Spanish Inquisition was originally founded to determine whether Jewish and Muslim converts to Christianity were sincere or not. The Inquisition later focused on rooting out heresy. It also commonly found people innocent, tortured very few people, and the total amount of executions over the few hundred years of the Inquisition in all of Europe was less than 3,000! This number was actually much smaller than that of those killed and tortured by King Henry VIII of England.

The Inquisition was also a moderating influence to the witch craze and witch hunts that were descending upon a hysterical Europe during this time.² They even executed some witch burners. Actually, the witch hunts reached a climax during the early years of the 'Enlightenment', with some notable 'Enlightenment' thinkers, such as Thomas Hobbes (1599–1679), supporting it. The Middle Ages, despite much popular mythology, was not a time of witch hunts, because the church at that time denied that witches even existed.

The Inquisition has also been charged with 'book burning'. However, the records show the books burned were few and generally were heretical or pornographic. Stark concludes by criticizing many recent histories because of their political correctness:

"Great historical myths die hard, even when there is no vested resistance to new evidence. But in this case, many recent writers continue to spread the traditional myths about this 'holy terror' even though they are fully aware of the new findings. They do so because they are determined to show that religion, and especially Christianity, is a dreadful curse upon humanity" (p. 133).

Scientific heresies

It is widely claimed that the Catholic Church and Christianity opposed science and persecuted scientists, and that the church tried to resist the

findings of Copernicus and jailed Galileo. In fact, many compromising scholars within the church bring up the ‘Galileo affair’ as an example of how the church has always resisted modern scientific findings, and that we should go along with the discoveries of uniformitarianism, deep time, and evolution. Of course, these philosophies are not the result of scientific observations but are *interpretations* of observations from the worldview of naturalism. Like so many other claims, this so-called history is full of falsehoods.

The most glaring falsehood claims that a ‘scientific revolution’ from the prescientific, superstitious ‘Dark Ages’ began with Copernicus (1473–1543), who dared defy the Catholic Church. The so-called scientific revolution actually began in the universities by professors, called ‘scholastics’, well before the time of Copernicus. A series of discoveries, including that the earth is round and circles the sun, were developed well before Copernicus, who just put the finishing touches on the heliocentric theory by mathematically describing it. However, most of what he wrote in his famous book *On the Revolutions of the Heavenly Spheres* was wrong.

Stark backs up his claim that there was a gradual development of science since the founding of the universities, by analyzing 52 great scientists from 1543 to 1680.¹ He adds:

“It should be noted, too, that the scholars involved in this long process [of scientific advancement] were not rebel secularists. Not only were they devout Christians, they all were priests or monks, and four of them were bishops and one a cardinal” (p. 152).

He found that all but one, Edmund Halley, were believers, and even his being one example of an atheist is questionable. He was accused of atheism by the very devout John Flamsteed, but

Halley denied this, and even invoked God in some of his arguments.⁹

But leaving Halley aside, about half of the rest were Catholics and the other half Protestants; and over a quarter of them were from England. Stark classed 31 of the 52 as ‘devout’ when there was “clear evidence of very deep religious involvement”. Moreover, most of the leading figures of the early ‘Enlightenment’ were not even scientists and played no part in a ‘scientific revolution’.

A hidden truth is that science actually got its beginning from the Christian worldview. There is a great amount of evidence for this. Stark summarizes:

“Moreover, the great scientific achievements of the seventeenth and eighteenth century were not made despite the Church; they were the culmination of normal scientific progress that took place through the centuries in the universities founded, controlled, and staffed by the Church. Indeed, the leading figures of this ‘scientific revolution’ were unusually devout and about half of them were Catholics, many of them clergy” (pp. 135–136).

Another falsehood is the ‘Galileo affair’.¹ Voltaire is typical of intellectuals then and now when he wrote:

“The great Galileo, at the age of fourscore, groaned away his days in the dungeons of the Inquisition, because he had demonstrated by irrefutable proofs the motion of the earth” (p. 163).

It is true that Galileo (1564–1642) was brought before the Roman Inquisition, charged with heretical teaching, and forced to recant. However, he was neither imprisoned nor tortured but was sentenced to a comfortable house arrest. What Galileo did was betray a trust with his one-time friend Pope Urban VIII and was only asked not to be so dogmatic about the heliocentric theory, since the evidence *at that time* was not so

clear. The heliocentric theory had been favoured by Catholic scholars for a long time before Galileo. Galileo was an unsavoury character in some ways but still remained a devout Catholic.

Catholics responsible for slavery

The Catholic Church has even been blamed for slavery. John Maxwell claimed in his well-received book *Slavery and the Catholic Church*, published in 1975: “Since the sixth century and right up until the twentieth century it has been common Catholic teaching that ... slavery is morally legitimate” (p. 169). However, the historical record shows just the opposite. The Church eliminated slavery more than 1,000 years ago, until it was re-established by the culture of the New World, in which case the popes vigorously and repeatedly opposed it.² Unfortunately, the popes and clergy had little influence, so they developed codes of conduct for the more humane treatment of slaves. These codes were commonly ignored or even made to say the opposite, but they did have a modest effect. Regardless through the influence of Christians, slavery was again abolished in Europe and in the Americas.

Slavery and racism has been a curse of mankind since the dawn of time. It was widely practised by many cultures before and after Christ. A theology against slavery was developed by the famous Catholic theologian Thomas Aquinas (1225–1274) and has been followed by the Catholic Church ever since. Modern historians seem to ignore the Catholic Church’s opposition to slavery: “Indeed, why were the many papal attacks on slavery not mentioned in even the most respected histories?” (p. 174). Stark summarizes: “Nevertheless, claims that the Church failed to oppose slavery and that slave codes merely served the masters simply aren’t true” (p. 185).

Miscellaneous other false claims

It appears the culture wants to blame the Catholic Church and other Christians for a wide range of atrocities that were perpetrated by various secular cultures and individuals. For instance, it is claimed that the Catholic Church has favoured tyrannical governments, mainly because they have opposed ‘liberation’ and other leftist groups. This conclusion is drawn because the church opposed the French revolution and the Spanish Civil War (1936–1939). However, these two revolutions strongly persecuted the Church and killed thousands of clergy as well as untold thousands of other people. The historical record shows that because the Catholic clergy often opposed dictators they were sometimes forced to support tyrants as the lesser of two evils. Of course, the Western press ignores the 20 million Russians executed for their religion by the Russian revolution. Stark concludes: “It simply isn’t true that the Church opposes freedom and democracy. Rather, it tends to oppose tyrants, especially those who attempt to destroy the Church” (p. 207).

It is also a myth that the Protestant Reformation produced religious freedom and a revival, gave birth to the work ethic, and spawned capitalism. Ironically, the most significant effect of the Reformation was to produce the Counter Reformation by the Catholic Church to correct most of the abuses that resulted from the ‘Church of Power’ and allowed the ‘Church of Piety’ to gain supremacy. The Church of Power developed from the time of Constantine when church offices could simply be bought and were often filled by non-Christians, a practice called ‘simony’. History also shows that capitalism actually started well before the Reformation by monks³ and that capitalism encouraged the development of the work ethic: “In fact, capitalism was a very Catholic invention: it first appeared in the great

Catholic monastic estates, way back in the ninth century” (p. 213).

Discussion

This book should give all of us pause to reflect. We must constantly be on guard for the myths of the past and present-day myths, and be aware that we likely have imbibed many myths. It always helps to check original sources.

One wonders why secular scholars continue to propagate so many myths about the Catholic Church, and Christianity, ignoring obvious historical evidence. It was during this ‘Enlightenment’ that the false history seems to have started. It was also during this time when Noah’s Flood was tossed out,¹⁰ millions of years were claimed, and eventually evolution was invented. How deep does fake history go?

It is shocking that so many common beliefs in our culture are false, but the history shows this to be the case, thanks to Stark and others. These myths are, in part, responsible for the encouragement of aggressive and violent atheists.

Protestants might note that this year is the 500th anniversary of the Reformation. A book like this should help us focus on the real problems with the Catholic Church, the theological ones, especially since the Counter-Reformation—denials of *Sola Scriptura* and *Sola Fide*—without being distracted by false charges. Note that while the Catholic Church now denies the *sufficiency* of Scripture, it has historically affirmed the *inerrancy* of Scripture, including all 66 books of the correct Protestant canon. The power of God’s Word in those 66 books is so strong that it is bound to produce great advances in science, art, and culture. So, Protestants should not be surprised that the Catholics’ use of those books would bring greater benefit than it is given credit for. Just as CMI has a page “Arguments creationists should NOT use”, this book could be called

“Arguments Protestants should not use”.

Christians have always been slandered by the culture, for instance in Acts 28 Paul invites the local Jews of Rome to hear him and they respond: “with regard to this sect we know that everywhere it is spoken against” (Acts 28:22b). But if a person wants to find out the truth, it can be found. Jesus says that if you want to find spiritual truth, you need to actively seek it: “seek, and you will find ...” (Matthew 7:7). Without searching out the truth, it is easy to believe the cultural myths that sometimes can be very persuasive.

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Pikes Peak BIF and the Flood (or Creation Week?)

I enjoyed the recent article on banded iron formations (BIFs) and their rapid formation¹. The Dickens article assigns specific types of BIF to the Creation Week and Flood:

“... early Precambrian BIFs forming in the early Creation Week and late Precambrian BIFs forming in the initial phase of Noah’s Flood.”²

This interpretation is based on earlier work by Dickens and Snelling proposing a unification of the uniformitarian Precambrian time period to Bible history.³ This concept was challenged^{4–7} and defended using naturalistic datasets (e.g. radiometric age-dating, plate tectonics, biostratigraphy, lithologic correlation) and the red herring, North Pilbara Terrane.⁸ This perspective remains unacceptable to many young-earth creationists because it creates confusion by defining and applying specific uniformitarian geologic time intervals *ad hoc* to biblical history.^{9,10}

Age-dating rocks and the problem with BIFs

BIFs generally do not contain fossils, so assigning an age-date relies on standard radiometric dating techniques. Despite the claim that the RATE study provides answers to the concerns of creationists willing to follow an accelerated form of nuclear isotope decay¹¹ many serious issues remain unresolved.^{12,13} Defining BIFs biblically by their naturalistic radiometric age raises several issues: 1) it defines the onset of the Flood between Dickens’ proposed ‘Precambrian’ age-dates,² 2) it contradicts previously proposed pre-Flood/Flood boundaries defined

by those using the time-compressed uniformitarian geologic timescale,^{14–18} and 3) it contradicts the proposed age of the Flood-formed Pikes Peak BIF¹⁹ which is not defined biblically by its uniformitarian-assigned radiometric age-date and is not applied against a time-compressed geologic timescale. Again, unnecessary confusion is created by young-earth creationists who accept and follow a modified ‘relative’ radiometric age or time-compressed geologic timescale.

Pikes Peak BIF

While not comprehensive, the Dickens article overlooked a relevant, previously published young-earth creationist work on the Pikes Peak BIF found across central Arizona (USA). This work was previously cited in response to Dickens and Snelling.⁴ The uniformitarian radiometric age-date of the Pikes Peak BIF (1.75 Ga—early Proterozoic) falls into Dickens’ ‘early Precambrian’ period and would by his definition be formed during the Creation Week.

Our study of the Precambrian Pikes Peak BIF in Arizona was conducted from a biblical Reconstructionist perspective and resulted in an interpretation completely different from what naturalists had previously proposed. From this study, the uniformitarian assumptions (and corresponding radiometric age-dates) were found to be unnecessary and the resulting biblical catastrophic interpretation actually resolved a number of issues viewed as enigmatic by naturalists. This Arizona BIF, in the context of its surrounding strata, is best interpreted as a product of the Flood, not the Creation Week.

As with any universal assertion, the Pikes Peak BIF invalidates the concept that they can be used to define a pre-Flood/Flood boundary. Their formation and development is not a unique global time horizon useful in defining biblical geologic history. I

continue to contend that every geologic area on Earth must be redefined within the context of biblical history and not by naturalistic age-dating assumptions based on radioisotopes or index fossils.

Clarification on the use of ‘relative’ radiometric dating in defining biblical history

Several questions remain in understanding Dickens’ application of ‘relative’ radiometric dates in support of the Remodeled framework of biblical history:

1. If radiometric age-dates are acceptable as ‘relative’ and not absolute, then how are erroneous age-dates corrected? Creationist work has demonstrated the inappropriate ‘Precambrian’ radiometric age given by the Rb–Sr method for the recent lava flows of western Grand Canyon as well as the overall failure of several other radiometric age-dating techniques used on the Proterozoic Brahma amphibolite.
2. Which of the current radiometric age-dating techniques are acceptable for young-earth creationists? Uniformitarians acknowledge that many of the older radiometric age-dating methods are no longer reliable and therefore should not be used to determine the appropriate age of Precambrian basement rocks.
3. How much of the naturalistic world view should young-earth creationists accept in defining biblical history? The acceptance of ‘relative’ radiometric dating opens the entire naturalistic chronology (i.e. 4.55 Ga) and would include the adoption of the entire uniformitarian geologic column and its naturalistic/evolutionary-supported assertions. Are young-earth creationists only drawing the line of distinction between worldviews (i.e. naturalism vs the Bible) over the concept of deep time?
4. In defining the antediluvian period using the radiometric age-dating of

basement rocks, are you suggesting that the pre-Flood earth was simply exposed shield with little-to-no sedimentary cover across the purported Rodinian supercontinent?

These questions were not addressed when previously posed²⁰ and it is hoped that an answer will follow in response to this letter. I appreciate the work on BIFs that Dickens has conducted and would appreciate further clarification.

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» Harry Dickens replies:

I am glad that Mr Froede enjoyed the article, *Banded iron formations formed rapidly*. I thank him for his comments. The following is intended for clarification.

Pikes Peak BIF

The Pikes Peak BIF is early Precambrian and described as Algoma-type.¹ It is not associated with mixtites, which are characteristic of the late Precambrian Rapitan-type BIF. Thus in terms of the *Journal of Creation* article’s YEC framework, it may be inferred that the Pikes Peak BIF formed in the early days of Creation Week, rather than in the Noahic Flood.

BIF and Flood onset not solely defined by radiometric age

The three types of BIF referred to in the article are described in terms of their field relationships and lithology, and so can be recognized in the field independent of radiometric age-dating. However, there are consistent trends, such as Rapitan BIFs being younger in age than Algoma and Superior-type BIFs. Relative radiometric age-dating is consistent with relative age indicated by field stratigraphic relationships—in

many locations worldwide, Neoproterozoic sedimentary strata can be found overlying older Precambrian crystalline basement. Such geology can be correlated respectively with early Flood and early Creation Week.

I do not define the onset of the Flood on radiometric dates on their own, independent of other evidence. The order in radiometric dates and the order in lithologies, as well as chemical and other isotopic trends go together in a consistent way in numerous cases.^{2,3}

I infer that:

- The erosion of land associated with the Flood’s rain can be correlated with Neoproterozoic geology, including mixtites interpreted as mass flows rather than as ‘glacials’ and that Sr isotope trends indicate continental erosion.⁴
- The corollary of this is that Archean to Mesoproterozoic crystalline basement rocks can be correlated with early Creation Week.
- The pre-Flood earth surface was destroyed (Genesis 6:13) in the sense of being totally wiped away (Matthew 24:39).

Global processes involved in early Creation Week should be considered. There is no need to lump so much geology into the Flood and not allow that some rocks may have formed in the Creation Week. Similarly, rocks consistent with the early Flood erosion of land due to the rain should not be discounted.

Geological sequences not deep-time geological ‘System Periods’

I am not defining and applying specific uniformitarian geologic time ‘Periods’ *ad hoc* to biblical history. There are patterns and order in radiometric dates that can be useful in a relative rather than absolute time sense. Recognizing literal sequences of observable, mappable rock units is not tantamount to accepting uniformitarianism and naturalism.

I do not want to malign the good intentions of those with a reconstructed biblical approach. However, I consider that much valuable work has already been done in mapping lithological sequences around the globe. There is a need to keep the baby and throw out the bath water:

The baby is the *observable*, mappable, correlatable order of stratigraphic successions with their characteristic fossils, lithologies, chemical signatures, and consistent pattern and order of isotopic ratios.

The bathwater is the *interpreted* long ages and molecules-to-man evolution.

Order in the rock record has been put there by God during His sequence of creative acts recorded in the Bible.[Not just Genesis 1 but chapter 7, 2 Peter 3 etc.] In stratigraphy there are significant patterns that can be related to God's creative work in designing the earth as man's home. As with many scientific datasets there may be some anomalous values. However, not using relative patterns in radiometric dates that reflect stratigraphic order, may be considered 'throwing the baby out with the bathwater'. The stratigraphic and isotopic order in the rocks is important evidence.

Neither uniformitarianism nor naturalism

With due respect to Froede, the 2008 work by Dickens and Snelling⁵ was definitely not uniformitarian in terms of rapidity of processes, including radiometric decay. A number of tectonic events (e.g. global rifting) and lithologic types (e.g. komatiites and BIFs) described and inferred environments (global oceans in early Creation Week and early Flood) are not uniformitarian and not occurring today.

A profound episodicity (episodicity is not uniformitarian!) exists in global Precambrian rock radiometric dates.⁶ The deformation age distribution of greenstone belts (most abundant

at 2.70, 1.85, 1.05, and 0.60 Ga) is broadly similar to the age distribution of Precambrian granites and detrital zircons.³ Heating events can reset radiometric dates to lower values.^{7,8} There are regional patterns in radiometric dates that can be related to different Precambrian geological provinces.

Naturalism excludes the Bible. When God created, He brought order to the universe even in atoms and continents, for God is not the author of confusion (1 Corinthians 14:33). Thus there should be harmony between God's Word and His Creation. Despite the complexity, we should not discount the order in observable, mappable Precambrian geology and associated measurable isotopic and chemical trends. Correlating such trends and patterns with God's Word is not naturalism.

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Pluto's moons or satellites?

I thank Dr Faulkner for his informative letter¹ commenting on Dr Hartnett's perspective,² and his concern for precision in terminology.

All the same, Dr Hartnett was hardly being unreasonable in referring to the 'moons' of Pluto instead of 'satellites'. After all, the *New Horizons* space probe that explored Pluto was launched by NASA, and the *NASA website itself* has a page called "Pluto: Moons".³ If it's okay for NASA, then surely it should be okay for Hartnett. And his first two sources referred to Pluto's "moons" in their titles, as does a paper in *Nature*.⁴

Also, the phrase "Galilean Moons of Jupiter" has been accepted parlance for centuries, even in modern astronomy journals. So it would seem that 'moon' and 'satellite' are approximate synonyms, and both acceptable. However, while there are artificial satellites, there are no artificial moons!

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Pseudogenes and plastic trees

I enjoyed reading Rob Carter's book review on *Adam and the Genome* in issue 31(2). I'd like to comment on Rob's statement:

"I do not have a ready answer for why this gene family would fall into a nested hierarchy, but, from experience, I am deeply suspicious of the evolutionary claims (p. 43)."

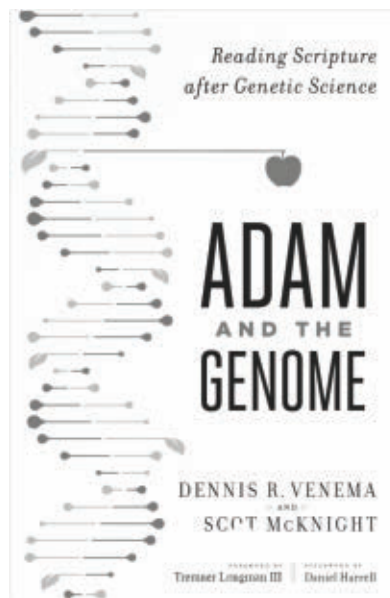
His suspicions are well founded. It appears this claim is the one posted on the *BioLogos* website on May 17, 2010, which I addressed in *Creation Matters*.¹ Essentially all one needs to do is read the open access article by Gilad *et al.*,² where they clearly state their methodology and the inferences they make.

Gilad *et al.*, first assumed the popular phylogeny where chimps are most closely related to humans, followed by gorillas, orangutans, and rhesus monkeys. Then they interpreted the data according to the tree:

"We inferred on which lineage each gene silencing event occurred by estimating the ancestral sequences of each node in a tree representing the phylogenetic relationships of the species (p. 3326)."

As Carter pointed out, olfactory receptor genes are believed to be among the most mutated genes known. When it appears that mutation has changed them to a pseudogene, often multiple frame-closing mutations are inferred. So how did Gilad *et al.* determine which one happened first?

"When more than one coding region disruption was identified in the same species, we inferred which occurred first by identifying disruptions shared between species. We considered only one disruption per gene to determine the gene silencing rate in each lineage (p. 3325)."



Could the data have fit as well or better in a different tree? Quite possibly, but that was not considered.

It is known that many genes in the gorilla are actually more similar to humans than those of the chimpanzee (Scully *et al.*).³ So, some gene trees fit one phylogeny, and other gene trees fit a different phylogeny. It has been claimed that pseudogenes are better to use than ordinary genes because they have no function and only change by random mutation (i.e. no selection occurs). However, in the same issue of *J. Creation* where Carter's book review appears, there is an article discussing pseudogenes that are not really pseudogenes at all (pp. 10–12).

Nice book review!

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Reading 'places' in Genesis 1–11

I found Alistair McKitterick's paper, Reading 'places' in Genesis 1–11,¹ very interesting and informative, and generally agree with his explanation. However, another explanation came to my mind. Is it possible that the reason "why the author gave such attention to the places and features of the four headwaters if they are nowhere relevant to the geography of the rest of the text", is that the author (or authors) of the *toledot* of the heavens and the earth (Genesis 2:4–4:26) and of the *toledot* of Adam (Genesis 5:1–6:8) actually wrote prior to Noah's Flood? Is it not possible that the records of these histories were preserved by taking them onto the Ark and handed down through the subsequent generations by the patriarchs, so they would later serve as a source or sources for Moses in his compiling of the pre-Flood history in Genesis? All of this, of course, would have taken place under the providential care and control of the Holy Spirit of God.

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» Alistair McKitterick replies:

Thank you for your comments regarding my article, and I'm glad you found it helpful. I'm aware of the argument you mention stemming from P.J. Wiseman (1888–1948) of viewing the *toledot* in Genesis (and elsewhere) as discrete historical sources.¹ Wiseman argues that *toledot* should be understood as a kind of signature at the conclusion of physical tablets which



"The location of Eden" by Hieronymus Bosch (c. 1450–1516)

were then passed on in some way from patriarch to patriarch down to Moses. The dozen mentions of the word *toledot* in Genesis, he believed, should be understood as colophons that point backwards as concluding refrains to the history of the person mentioned (or creation in the case of Gen. 2:4).² This idea of Genesis consisting of discrete historical documents handed down to Moses has been seized upon as a rebuff to those who would argue that the Pentateuch was stitched together from folklore and priestly sources late on during the Babylon exile. However, it should be noted that neither Wiseman's nor Wellhausen's accounts of the origin of the Pentateuch have any historical evidence to support them (there are

no historical examples of 'Terah's *toledot*' in the same way that there are no historical examples of a so-called Jahwist source). Moreover, the belief in Mosaic authorship of the Pentateuch is not helped by the claim that Moses compiled Genesis from patriarchal tablets. The way we understand the *toledot* must be decided by literary analysis of the biblical text as we have it in its final form.

The *toledot* structure of Genesis is much better understood as a literary device (that Moses intentionally used) that indicates how we should read Genesis, where the theological emphases lie, and how God's plan developed through time. Wiseman's argument that the *toledot* look backward or are conclusions to sections is wrong. The *toledot* are forward looking and act as headings. The phrase should be understood not as a 'history' but rather as in the concept of generation. In a helpful article,³ Marten Woudstra translates the term *toledot* this way: "In the word *toledot*, therefore, we find the meaning: this is what came of it. And in the genitive 'these are the *toledot* of ...' we have the thought: this is where it started from." The *toledot* introduce sections of Genesis showing how God was working in and through the patriarchs and their offspring (looking forwards) to achieve his purposes and fulfil his promises. They are not primarily biographical about the named patriarch (looking backwards). Their literary function can be seen in the suspense that is created by having a *toledot* of Terah but not one of Abraham, and by the brief space given to Ishmael's descendants compared to those of Isaac. Wright argues that "the plot of the book moves forward in a 'hopscotch' fashion, noting Ishmael and Esau, as it bypasses them into the stories of the families of Isaac and Jacob".⁴ There is much more that could be said about the literary *toledot* structure.⁵ The main point to be taken,

however, is that seeing the *toledot* in Genesis as remnants of cuneiform tablets taken on board the ark is neither scriptural nor helpful. We are much better advised to consider the complex literary structure and narrative unity of the *toledot* as evidence of the single genius who authored the Pentateuch.

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2. I note that you do not follow Wiseman's colophon approach (because you refer to the *toledot* of Adam as being Genesis 5:1–6:8) but, generally speaking, the idea of the *toledot* being discrete historical sources derives from him because he believed he identified the use of colophons in ancient cuneiform texts that he'd found. Without that link, there is nothing historical at all to support the view that *toledot* are discrete historical documents.
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Perspectives on ancient chronology and the Old Testament—part 1

Murray R. Adamthwaite

A growing mood among secular scholars is to dismiss out of hand the biblical history of Genesis through 1 Kings, because, it is contended, there is a total mismatch between these accounts and the archaeological record. Since their verdict is that no such correlation exists, the Bible's stories of the patriarchs, Israel in Egypt, the Exodus and Conquest, and even David and Solomon, are to be dismissed as merely pious legends, without historical foundation. The answer to such a challenge is to seek another time location where these events can be found, even if that location is out of harmony with accepted chronological schemes, and thus construct a revised chronology. While this will involve a compression of the conventional secular schemes, it is essential in order to achieve a match of biblical history with records from Egypt and elsewhere. In this and a subsequent article I outline first the conventional schemes of ancient chronology for both Egypt and Mesopotamia, to serve as starting points for discussion and revision. Then I offer some preliminary observations in regard to correlations of scriptural clues with ancient history and chronology.

According to Genesis 11:10–12:4, a period of 367 years elapses between the Flood and Abraham's entry into Canaan. If we round this off to 400 (including the Septuagint's insertion of Cainan after Arpachshad) on any account this is much shorter than the long ages of 'cultural evolution' which modern archaeology demands. Furthermore, correlation of the biblical accounts of patriarchs, Exodus, Judges, and Kings of Israel with ancient history as proposed and accepted by secular historians has proved to be an intractable problem. Some correlations in the monarchy period are quite secure: Nebuchadnezzar and the capture of Jerusalem (586 BC), Sennacherib's invasion of Judah (701 BC), and the fall of Samaria to the Assyrians (722 BC) are examples that come to mind. However, when we go further back, to the early first millennium BC and before, problems arise: who was the Pharaoh whose daughter Solomon married (1 Kings 3:1)? Can we identify the Aramaean kingdoms which David conquered (2 Samuel 8)? Can the various oppressors during the Judges period be identified in extra-biblical texts? Then, of course, there is the old but persistent problem of the Pharaoh of the Exodus—and of Joseph for that matter.

In attempting to solve these problems there are two criteria I would lay down at the outset:

1. Leaving aside the conclusions of secularists who have no commitment to the Divine inspiration of Scripture, there are widely differing views among believing scholars. Consequently, there should be a willingness from all sides to consider sympathetically the views of others within the believing community. There is no room for dogmatism, of which there has been far too much over the past century or more. On one hand there is the dogmatism of those who accept the framework of ancient history according to the
2. secularists (e.g. the 30 dynasties of Manetho, albeit with variations) as a datum, and attempt to fit the biblical data into it. Examples of this are Kitchen,¹ Hoffmeier,² Currid,³ and Aling.⁴ This in my view has been an exercise of trying to fit the proverbial square peg into the round hole.

Another brand of dogmatism has been taking, for example, Velikovsky's revised scheme of ancient history as a definite starting point—at least as 'de-astralised' by Courville⁵—and building a scheme turned almost upside-down in comparison with the accepted scheme. Advocates of this approach—and similar types of drastic revision—can be just as hard-line in their adherence as their opponents on the more 'secular' side.

My own view is that we must patiently sift the data, and work from the known to the unknown in the light of biblical evidence (determined from proper exegesis), archaeology, and ancient texts. My own considered opinion is that the accepted Egyptian chronology is grossly inflated, but inflated not only in one but in several areas and periods: the Early Dynastic period; the Old Kingdom and First Intermediate; and certainly the Third Intermediate Period. Hence the scheme needs reduction, but by centuries overall, not merely by a few years here and there. However, any conclusions must be tentative if the evidence is inconclusive.

My own view is that we must patiently sift the data, and work from the known to the unknown in the light of biblical evidence (determined from proper exegesis), archaeology, and ancient texts. My own considered opinion is that the accepted Egyptian chronology is grossly inflated, but inflated not only in one but in several areas and periods: the Early Dynastic period; the Old Kingdom and First Intermediate; and certainly the Third Intermediate Period. Hence the scheme needs reduction, but by centuries overall, not merely by a few years here and there. However, any conclusions must be tentative if the evidence is inconclusive.

For the first millennium BC we have the combined evidence of the biblical data and the Assyrian Eponym lists (*limmu*-lists). Although the chronology of Edwin Thiele may need some refinement and adjustment (e.g. the latter half of the eighth century BC is still rather fuzzy—and too short—on Thiele's scheme), the basic outline cannot but be accepted. Taking the Assyrian data for starters, we have

an unbroken list of years back to 911/912 BC, but prior to that uncertainties begin, and the further back we go the more these uncertainties increase. Even among the secularists there are the long, middle, and short chronologies, albeit the ‘long’ is now largely abandoned.⁶ We must then look for correlations and synchronisms of kings and events, but this is not easy: from our perspective we might talk, for example, of Shalmaneser I and Hattushili III, but ancient texts do not have Roman numerals after a king’s name. Again, Muwatilli II fought Ramesses II at the Battle of Kadesh in the fifth year of the latter’s reign, but this synchronism leaves open the question of the chronological placement of Ramesses II.

On the Egyptian side it is all too easy to point to a similarity of a name in the Bible and on an Egyptian monument, then jump to the conclusion that these two names refer to the same king. An obvious example is the Shishaq of 1 Kings 14:25, and the Shoshenq of the Bubastite Portal. Yet as we compare the itinerary of this king’s conquests in Palestine as per the Bubastite Portal with the account in 1 Kings 14:25–26 they are quite different: Shoshenq never went near Jerusalem. Are then the two references to the same person after all?

A related problem in this connection concerns by what name an Egyptian pharaoh was known in foreign nations, and for that matter by the general populace. As is well known, the royal titulary had five names: the Horus, the *nebt*, the golden Horus, the *nesu-bit* or prenomen, and the son-of-Re or birth name. We can gain some insight here from the letter of Ankh-hesen-amun, the widow of the teenage king Tutankhamun, to Šuppiluliuma of the Hittites. She refers to her dead husband as Niphururiya—a precise rendering in cuneiform of Tutankhamun’s prenomen Nebkheperure, but not by his birth name.⁷ This seems to have been usual for diplomacy of the time. As to popular versions of a pharaoh’s name, it is well known that, for example, Ramesses II was known as Sessi, apparently a hypocoristicon of his birth name.⁸

Then there are the various Egyptian king lists: Abydos, Karnak, Turin Canon, Palermo Stone (for the early period), to name some, but we need to bear in mind the purpose of these lists. They were not composed, of course, to inform historians of the 20th and 21st centuries! They were rather political statements; propaganda to proclaim continuity with their ancestors and thus legitimacy for their own tenure of the throne. That said, however, their evidence is as it is and must be given its due weight.

So again, evidence must be sifted and evaluated, but my own view is that while the existing scheme of Egyptian history needs some ‘squeezing’—at times radical squeezing—at the same time the generally agreed scheme of the secularists cannot be dismissed out of hand, or drastically overturned in the way that radical



Figure 1. Sumerian king list, Ashmolean Museum, Oxford, UK

revisionists seek to do (such as those following Velikovsky and Courville). The Bible must be our bedrock position indeed, but at the same time we need to listen carefully to the secularists, without necessarily accepting their schemes wholesale.

Before proceeding further, in order to acquaint the non-specialists with ancient history, and enable them to understand better the drift of argument presented here, I will outline the conventional historical schemes of first, ancient Egypt, and then second, of ancient Mesopotamia and Anatolia.

Pharaonic Egypt according to conventional chronology⁹

Dynasties	Leading King	Dates (BC)
Early Dynastic		3150–2686
Early Egypt formed with two major kingdoms, Lower and Upper Egypt, which were often at war with each other. However, two kings are known for this pre-Dynastic period, ‘Scorpion’ and Nar’mer, the latter apparently being the king who united by force the two kingdoms. Nar’mer’s successor, Hor-Aha, who also bore the <i>nebt</i> -name Men, seems to be the Menes of Manetho’s record, the founder of a united Egypt.		

Dynasty One	Nar'mer	}	3100–2890
	Hor-Aha / Men	}	for Dynasty One
	Djet [Uadji]	}	
Dynasty Two	Seth-Peribsen		2890–2686
	Khasekhemwy		for Dynasty Two

Old Kingdom 2686–2500

Although Dynasty Two had been plagued by civil war between Upper and Lower Egypt, by the end of the dynasty the kingdom was unified again, and now blossomed into the Old Kingdom, the so-called 'pyramid age'.

Dynasty Three	Djoser	2688–2649
Four	Khufu	2589–2566
	Khafre	2558–2532
	Menkaure	2532–2504

Late Old Kingdom 2498–2181

Dynasty Five	Userkaf	2498–2491
	Unas	2375–2345
Dynasty Six	Pepi I	2332–2283
	Pepi II	2278–2184 (!)

First Intermediate Period 2181–2040

A combination of famine, the long reign of Pepi II, and seizure of control by the various provincial nomarchs led to a loss of control by the royal authority.

Dynasties Seven to Ten Egypt in chaos

Middle Kingdom 2040–1663

Theban rulers in the south (Intef I, II, and III) gradually pushed their boundaries north, until Mentuhotep I finally re-unified Egypt with victory over Lower Egypt in the Heracleopolitan War.

Dynasty Eleven	Intef III	2069–2060
	Mentuhotep I	2060–2010
Dynasty Twelve	Amenemhet I	1991–1962
	Senusret III	1878–1841
	Amenemhet III	1842–1797
Dynasty Thirteen	Sobekhotep III	c.1745
	Neferhotep I	1741–1730
	Sobekhotep IV	1730–1720

Second Intermediate Period 1663–1570

Dynasties Fourteen to Seventeen With a decline under Dynasty Thirteen Egypt now fell to foreign invasion.

- Hyksos Rule	Sheshi	
	Apepi I & II	
- Expulsion of Hyksos	Kamose	1573–1570

New Kingdom 1570–1070

Having expelled the Hyksos rulers, this period saw Egyptian expansion into a major empire from Nubia to the Orontes River in North Syria under such warrior kings as Thutmose III, Amenhotep II, and Ramesses II.

Dynasty Eighteen	Ahmose	1570–1546
	Hatshepsut	1498–1483

Dynasty Nineteen	Thutmose III	1504–1450
	Amenhotep III	1386–1349
	Akhenaten	1350–1334
Dynasty Twenty	Seti I	1291–1278
	Ramesses II	1279–1212
	Merenptah	1212–1202
	Ramesses III	1182–1151
	Ramesses XI	1098–1070

With the death of the last Ramesses the glory days of the New Kingdom were now well and truly gone, the country's economy was in ruins, foreign invaders were again making their presence felt (this time by the 'Sea Peoples'), and Dynasty Twenty gave way to the Third Intermediate Period.

So far this shows the conventional scheme of Egyptian history, and its accompanying chronology, but, as noted above, where in this scheme do we place Abraham, Joseph, the Exodus, early Israel, and for that matter David and Solomon? Despite massive efforts and endless discussions by Christian scholars over the years there has been no solution, other than to highlight the 'local Egyptian colour' in the Joseph and Exodus narratives in particular. This sort of discussion may be all well and good, but it does not yield the Pharaohs of either the Joseph period, or the Exodus event. The only way forward is to revise the conventional scheme of Egyptian history, and reduce the associated chronology. This way a match between the Bible and the ancient Egyptian records can be achieved.

However, at the other end of the Fertile Crescent there are also the Mesopotamian records, which are just as important for this whole attempted revision as any investigation of Egypt, since Abraham came from Ur in Lower Mesopotamia, and Israel in later history had contacts with both Upper and Lower Mesopotamia, facing invasion from both. So again, I present here the conventional scheme of Mesopotamian history as a prelude to highlighting major problems therein.

Conventional scheme of Mesopotamian history¹⁰

The earliest phase of Mesopotamian history manifests a network of city-states across Lower Mesopotamia, known collectively as Sumer, but each with its own government, and often at war with each other. According to the Sumerian king list these city-states date from the end of the Great Deluge, beginning with Kish. Sometimes one city (e.g. Uruk) dominated, while at other times other cities (e.g. Lagash or Ur) had the hegemony, until Sargon of Agade (Akkad) conquered the entire region and then expanded further north. Sumer was also subject to incursions from Elam and peoples from the mountain regions between the two. This table traces the conventional chronology from the Early Dynastic I (2900) through to the early second millennium, while the dates, even for the secularists, are uncertain.

Lower Mesopotamia

Kish	Ur	Uruk	Lagash	Dates
Kish I		Uruk I		c. 2900
↓	Royal	↓		
Enmebaragesi Cemetery				c. 2700
Mes-īlim				
(c. 2550)	Ur I	Gilgamesh	Lugal-šag-	c. 2560–2525
	Mesannepadda	↓	engur	c. 2500
Kish II	I	Uruk II	Ur-Nanše	c. 2485–2450
↓	Meskiagnunna	↓	Eannatum I	c. 2455–2425
Enbi-lštar	Ur II			c. 2430
Kish III	4 kings- names unkn.	Lugal-kiniše- dudu		c. 2400
↓		↓		
Kish IV		Uruk III	Uru-inimgina	
Ur-Zababa	Lugalzagesi			c. 2340
Agade Dynasty				
Sargon				2334–2279
Naram-Sin				2217–2193
Anarchy				
	Uruk IV			
Dynasty of Gutium				
				2193–2120
The Gutians invade Sumer and Akkad, ending the Akkad Dynasty				
	Ur III	Uruk V		
	Ur-Nammu	Utu-hegal	Governors of 2112–2095	
	Shulgi		Lagash-vassals of Ur	
	Ibbi-Sîn			
	Fall of Ur III			2004
Dynasty of Isin and Larsa				
				2023ff

Points to note regarding the table

1. The dates above are those of Roux (1993), but more recently Kuhrt has revised downward many of these more conventional dates. For example, Sargon of Akkad is redated to 2296–2240 and Naram-Sîn to 2213–2176. On this chronology, she notes, “kings are still ruling in Agade at the time when Ur-Nammu, founder of Ur-III, establishes himself in power”.¹¹ Thus the dates for this early period are very uncertain and obscure, as also are synchronisms between the various city-states. These early dynasties certainly overlapped, as is now known, and from

a biblical standpoint they can—and should—be reduced even further to fit a biblical framework.

2. The two tables do not really cohere with each other. On inspection it is evident that the Egyptian state begins at c. 3100 BC, whereas Mesopotamian history begins at c. 2900 BC. Yet even the secularists will proclaim that “history begins with Sumer”.¹² The way around this is appeal to various pre-literate cultures at each end of the Fertile Crescent: Naqada I and II at the Egyptian end; Halaf, Ubaid, and Uruk periods at the Mesopotamian end, with periods stretching back through Chalcolithic, Neolithic, Mesolithic, and Palaeolithic over many millennia. However, all these periods are based on dubious dating methods and correlations, and evolutionary assumptions, which I will not discuss here.
 3. According to the Sumerian king list, kingship after the Deluge was first established at Kish. According to Gen. 10:8 Cush was the father (ancestor?) of Nimrod, but he is not the same Cush as in 10:7, whose descendants inhabited North Africa and Egypt. Now with the mere difference of a vowel Cush (or Kush) becomes Kish, the ancestor of the peoples of Mesopotamia, who gives his name to the founding city, and thus the Sumerian king list seems to preserve this tradition, albeit in somewhat garbled form.¹³
 4. Another issue concerns where in the above timeline of Mesopotamia we are to place the Tower of Babel event. Since much of the early history of Mesopotamia is—from cuneiform sources—obscure, and immersed in myth and legend, it is from the present perspective almost impossible to posit a firm time location. As I argued in an earlier article on ancient languages,¹⁴ Sumerian is but one of a plethora of languages which appear on the Near Eastern scene at the same general time—all unrelated to each other, and all exceedingly complex. Hence a tentative proposal would be a time when Sumerian first appears (unless, of course, one wants to posit Sumerian as the original language), i.e. the time of Enmebaragesi of Kish. Accordingly, it goes without saying that this would be in the context of a reduced chronology.
 5. Nimrod is given special mention as the founder of the first Mesopotamian empire encompassing both Lower Mesopotamia, i.e. Sumer, and even as far north as Assyria (Nineveh and Kalah). From the cuneiform records there are two possible candidates: (i) Gilgamesh, and (ii) Sargon of Akkad.
- (i) From certain building inscriptions, the Tummal inscription, and the epic poem “Gilgamesh and Agga” we know that Gilgamesh was (a) a historical king, and (b) a contemporary of Agga of Kish and Mesannepadda of Ur. He was the supreme hero of Sumerian legend for his exploits and adventures, but in that literature he has morphed into a mythical god-man, principally as a seeker for immortality in the famous *Gilgamesh*



Figure 2. Ancient Sumerian city of Ur. In the foreground, residential dwellings; in the background, the famous tower-temple (ziggurat) of Nanna/Sîn, the moon deity.

*Epic.*¹⁵ That Gilgamesh was a mighty hero, whose exploits became proverbial throughout Mesopotamia, is undoubted, but no empire as outlined in Gen. 10:10–12 has been or can be attributed to him.¹⁶

- (ii) Sargon of Akkad is the other, much more likely candidate for Nimrod. First, Sargon (Šarru-kin: “the king is legitimate”) is a throne name, not a personal name, so it is futile to try to link this phonetically with Nimrod.¹⁷ If we see Cush in Gen. 10:8 as the ancestor of Nimrod (which would be necessary even on the Gilgamesh identification), then it is quite plausible to identify Sargon as Nimrod. He certainly conquered the entire Lower Mesopotamian region (“the land of Shin’ar”), and then proceeded to Assyria, and even as far as the northern Levant and the Mediterranean, thus building the first known empire in human history. Furthermore, he too became a legendary hero in his own

right, and a fearsome and ruthless warrior, as a proper understanding of the Hebrew *gibbōr šayid* (Gen. 10:9) would indicate.¹⁸ Hence Assyria became known as “the land of Nimrod” in later lore (cf. Micah 5:6), and even today the site of ancient Calah (Akkadian Kalhu) is known as “Nimrud”.

Patriarchal period: proposed correlations

Two clues arise in regard to the patriarchal period: one specific regarding Abraham; the other general in regard to the period as a whole.

1. We begin with Abraham. He should be placed at Ur in Lower Mesopotamia, a major cultural centre for ancient Sumer, known in Scripture as “the land of Shin’ar”. Some have tried to place him in Northern Mesopotamia, e.g. Cyrus Gordon,¹⁹ but his reasons are not cogent. As to

where to place Abraham in the chronological scheme above, given that his dating is approximately 1950 BC, he can plausibly be placed in the Third Dynasty of Ur, provided that the chronology can be reduced such that Ur III belongs in the period 2000 to 1900 BC. Such a placement would fit admirably, as this period was the last—and greatest—of Sumerian civilization, when its culture, social organization, and political power reached their zenith, and humanly speaking it would have been a hard place to leave. Only a man of faith in God, who sought “a city which has foundations” (Heb. 11:10) and “a better country” (Heb. 11:16) would have seen Ur as a sinking ship, as indeed it was, since it collapsed within Abraham’s lifetime on the synchronism proposed here. Thereafter Sumerian civilization passed into history, while Ur became a virtual non-entity, reviving only briefly in the time of the late Neo-Babylonian Empire, c. 550 BC.

2. Furthermore, there is a consideration of the patriarchal period in more general terms, where a little-noticed passage in the book of Job gives some important evidence. The Book of Job, by general consent of conservative scholars, is the oldest book in the Old Testament canon. Bearing that in mind, we seem to have a reference to the pyramid tombs of kings and nobility in Job 3:14–15. The text reads in NKJV: “With kings and counsellors of the earth, who built ruins for themselves,
Or with princes who had gold, who filled their houses with silver.”



Figure 3. Inscribed brick of Ur-Nammu, founding king of the Third Dynasty of Ur

The interesting phrase here is the latter half of v.14, in the Hebrew, *habbōnīm h'rābōt lāmō*, which is better translated, “who built tombs for themselves”. Hartley comments as follows:

“In support of taking ‘ruins’ as tombs is the parallel term ‘house’ in v. 15b (cf. 17:13; 30:23; Eccl 12:5, where ‘house’ stands for Sheol), and the use of this word in association with ‘the pit’, the realm of the dead in Ezek. 26:20. In that case Job is alluding particularly to the motivation that inspired the building of them, i.e. it was believed that the inhabitants of these monuments ... had a more peaceful existence in death than the masses who were living.”²⁰

If Hartley is correct in his analysis, and especially if the *h'rm / h'rābōt* equation is correct, then the Egyptian pyramids, with all their treasures for the afterlife (in their belief) are contemporary with Job. In the Old Kingdom the afterlife was indeed something for royalty and nobility, as the text here clearly implies, i.e. before the ‘democratisation’ of the afterlife in later periods.²¹ Note also the participles in Job 3:14–15: the kings are building tombs, and the nobles are filling their houses with silver. These constructions seem to indicate a practice contemporary with Job, not something in the distant past.

But what is the relation of Job to Israel? Many conservative scholars believe that the story of Job belongs approximately to patriarchal times, even if the composition comes later, as we find argued, for example, in Gibson’s commentary.²² He cites the lack of any reference to the Mosaic Law or the covenant with Israel; then to the constant use of the general name for God, *“loah*, in the speeches (although *Shaddai*, “Almighty” occurs frequently), as opposed to Yahweh, which occurs only in the Prologue and Epilogue.²³ Archer echoes the same arguments, and believes further that both the historical Job and the book’s composition belong to the pre-Mosaic age, either the patriarchal age or during the Egyptian sojourn.²⁴ If this reasoning is at all correct, then the pre-Mosaic or patriarchal age, the age of Job, is contemporary with the pyramids of at least the Late Old Kingdom.

If the above reasoning seems somewhat tenuous, it is simply following clues where they turn up, and to follow where they might lead, which is the task and procedure of the historian.

As to Abraham in Egypt (Gen. 12:10–20), when he passed off his wife Sarai as his sister (partly true), it is not possible to say who that pharaoh was, and any attempt to identify him is speculation.

Conclusion

To sum up thus far:

1. The schemes of third millennium BC chronology adopted by the secularists do not cohere with the short timescale of Gen. 11 for the same period; still less do the vast archaeological ages of pre-literate cultures proposed for the period prior to the emergence of the Sumerian city-states. Since it is known that several of the ostensibly sequential dynasties of the Sumerian king list were in fact contemporaneous, biblical historians should be looking for evidence that these supposedly sequential ‘cultures’ were likewise contemporary with each other. A reduced timeline is essential for correlation of ancient Mesopotamia with Scripture.
2. The scheme of Egyptian chronology requires compression, and not only in one particular area, in order to correlate it with a reduced time period for Mesopotamia, and with scriptural chronology. The Early Dynastic period, the Old Kingdom, and the three Intermediate periods all need to be reduced, but this will require serious work by a team of ancient historians and archaeologists working from a biblical framework.
3. Already there are hints and indications of correlations and synchronisms in the Scripture, which not only require a reduced timeline, but also provide some relatively fixed points for a reconstruction of ancient chronology. A subsequent article will explore this aspect further.

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Talking about time: the semantic overlap of the terms '*chronos*' and '*kairos*' in biblical usage

Lita Cosner

William Dembski popularized the idea of 'kairological time' to try to explain how Adam's sin could have caused death and suffering millions of years before he existed. However, in doing so he imports the *specialized* meanings of the philosophical terms '*kairos*' and '*chronos*'¹ into the biblical context; this is unwarranted, as an examination of the usage of *kairos* and *chronos* in both the LXX and NT reveals. Furthermore, this examination also reveals that there is no clear dichotomy between the terms. In addition, neither the terms '*chronos*' nor '*kairos*' are used in the context of 'when God created', and 'kairological time' fails as an approach to theodicy.

In the Genesis account of creation and the Fall, death, disease, and carnivory are the consequences of Adam's sin. One of the biggest problems for those who wish to reconcile the Genesis account of origins with the belief that the earth is billions of years old is that the fossil record preserves a record of animal death, disease, and carnivory, which, when interpreted within the uniformitarian framework, precedes any possible date for Adam's sin.

Those who wish to maintain the billions-of-years timescale alongside a commitment to the authority of Scripture have come up with various attempts to solve the problem of death before the Fall. One of the more inventive suggestions is William Dembski's (figure 1) idea of 'kairological time'. Just as Christ's salvific work on the Cross was able to save people who had faith before He died, Dembski argues that Adam's sin had effects which extended both backward and forward in time, meaning that Adam's sin could have caused actions that preceded him by millions of years.

A key part of his argument is the distinction between the words '*chronos*' and '*kairos*':

"This distinction between the order of creation and natural history reflects a fundamental distinction in the nature of time. In English, we have just one word for time. But the Greek of the New Testament had two: *chronos* and *kairos*. According to Arndt and Gingrich's standard lexicon of New Testament Greek, *chronos* denotes mere duration whereas *kairos* denotes time with a purpose (especially a divine purpose)."²

Ignoring the objectively false statement that English has only one word for time (look in any thesaurus), BDAG's entries for both *chronos* and *kairos* are lengthy and do not say what Dembski claims AG (the ancestor of BDAG) says. Dembski asserts a clear distinction between the Greek

words '*kairos*' and '*chronos*'. But where does this distinction come from? In fact, an earlier paper by Dembski³ included a nearly identical statement which also drew on a source that makes it clear that *chronos* and *kairos* are used as technical English philosophical terms, rather than as Greek words. Dembski cites:

"Chronos is the time of physics and kairos is an ordered but unmeasured kind of time outside space-time. Kairos is fundamental, and chronos is derivative."⁴

But he neglects to note the *very next sentence*:

"In spite of their origin in Greek, *chronos* and *kairos* are used in this paper as technical terms in English."⁴

So, for his argument about kairological time, Dembski uses the technical definition of philosophical terms in a language that did not yet exist when the New Testament was written to inform his exegesis of texts in Genesis, which were not written in Greek originally, without any attempt to link (the modern philosophical appropriation in English of) the Greek terms to any equivalent Hebrew idea. It is difficult to precisely enumerate the number of errors he is committing in this approach!

However, analysis of the use of *chronos* and *kairos* in the Septuagint (LXX) and the Greek New Testament does not support this generalization.

Chronos and *kairos* in the LXX

The Old Testament documents were originally written in Hebrew, so Dembski's argument should have looked at how time was presented in terms of the Hebrew words, not Greek. However, the LXX uses the words '*kairos*' and '*chronos*' many times, enough to establish a clear semantic range for each term.

Chronos

Chronos, being a generic word for time, is often used in combination with other terms to translate a wide range of Hebrew chronological terms.

The LXX most often uses *chronos* to translate the Hebrew word *yôm* when it is used in ways that make the literal translation, *hēmera*, less than ideal. When *chronos* and *hēmera* are used in the same context to translate the Hebrew *yôm*, this can be instructive. For instance, Joshua 4:14 LXX reads:

“ἐν ἐκείνῃ τῇ **ἡμέρᾳ** ἠύξησεν κύριος τὸν Ἰησοῦν ἐναντίον παντὸς τοῦ γένους Ἰσραὴλ, καὶ ἐφοβοῦντο αὐτὸν ὥσπερ Μωυσῆν, ὅσον **χρόνον** ἔζη.”

[On that *day* the Lord exalted Iesous before the whole race of Israel, and they feared him, as they had Moyses, for as long *a time* as he lived.⁵]

Likewise, Isaiah 23:15 LXX reads:

“καὶ ἔσται ἐν τῇ **ἡμέρᾳ** ἐκείνῃ καταλειφθήσεται Τύρος ἔτη ἐβδομήκοντα ὡς **χρόνος** βασιλείας, ὡς χρόνος ἀνθρώπου· καὶ ἔσται μετὰ ἐβδομήκοντα ἔτη ἔσται Τύρος ὡς ἄσμα πόρνης”

[And it shall be on that *day* that Tyre will be abandoned for seventy years, like the *time* of a king, like the time of a man.⁶ And it shall be that after seventy years Tyre will be like the song about a prostitute:]

So, we see that when *yôm* means ‘day’ in the context, the LXX translator chooses *hēmera* as the appropriate term, and when *yôm* is used more figuratively, *chronos* is chosen to encompass that meaning.

In a few places, *chronos* is ‘added’ to the translation of the Hebrew text to make clear the chronological implication of the ‘literal’ translation of the word.

Joshua 24:29 LXX (24:31 in English Bibles) says:

“καὶ ἐλάτεθesen Ἰσραὴλ τῷ κυρίῳ πάσας τὰς **ἡμέρας** Ἰησοῦ καὶ πάσας τὰς **ἡμέρας** τῶν πρεσβυτέρων, ὅσοι ἐφείλκυσαν τὸν **χρόνον** μετὰ Ἰησοῦ καὶ ὅσοι εἶδον πάντα τὰ ἔργα κυρίου, ὅσα ἐποίησεν τῷ Ἰσραὴλ.”

[And Israel served the Lord all the *days* of Iesous and all the *days* of the elders who drew out the *time* with Joshua and who knew all the works of the Lord that he did for Israel.]

In this verse, the underlying Hebrew has the literal meaning of ‘stretched out’ but in this context it means ‘outlived’. The translator thus used the word for ‘drawing or stretching out’ in Greek, but added *chronos* to make the chronological meaning clear. This is interesting, because ἐπιζῶ (*epizaō*) would have been a good choice for translating ‘outlive’ if the author had been following a ‘dynamic equivalence’ translation technique more concerned with communicating the *idea*, but in this case he was clearly following a ‘functional equivalence’ method, which sought to translate as literally as possible, even when that resulted in stilted Greek.

Table 1. The use of *chronos* in the LXX. Asterisk indicates Aramaic cognate in original.

English translation	Hebrew term	LXX reference
Day/days, always	<i>Yôm</i>	Gen. 26:1, 15; Deut. 12:19; 22:19, 29; Josh. 4:14, 24; 24:29; 2 Esd. 4:15*; Prov. 15:15; Job 10:20; 32:6, 7; Isa. 23:15; 38:5; 65:20; Jer. 45:28; Dan. 2:44*
End	<i>Āhārīt</i>	Deut. 32:29
Turn	<i>Tōr</i>	Est. 2:15
Youth	<i>Ālūmīm</i>	Psa. 88:46
Interrogative / How long?	<i>Matāy</i>	Prov. 1:22
Now	<i>Pā’ām</i>	Prov. 7:12 (2x)
Prolong	<i>Arak</i>	Prov. 28:16
Appointed time	<i>Z’mān</i>	2 Esd. 20:35; 23:31; Eccl. 3:1; Dan. 2:16*, 21*; 7:12*
End	<i>Qeš</i>	Job 6:11
Aged	<i>Yašiš</i>	Job 12:12
Limit	<i>Hōq</i>	Job 14:5, 13
Forever	<i>Ōlām</i>	Isa. 9:6; 34:10, 17
Instant	<i>Rēgā</i>	Isa. 54:7
Time	<i>Ēt</i>	Jer. 30:2; 37:7; 38:1

Interestingly, if one were to speak of events ‘from long ago’, the LXX word to use would be *chronos*, not *kairos*. Specifically, the construction ἀπὸ χρόνων αἰῶνος is used to designate timing of events that happened in past times without specifically identifying when. This construction is used in 2 Esdras 4:15.

Kairos

Kairos is most often used to denote seasons, or events that recur at set times, like harvest time. The first usage is in Genesis 1:14 LXX:

“καὶ εἶπεν ὁ θεὸς Γενηθήτωσαν φωστῆρες ἐν τῷ στερεώματι τοῦ οὐρανοῦ εἰς φαῦσιν τῆς γῆς τοῦ διαχωρίζειν ἀνὰ μέσον τῆς ἡμέρας καὶ ἀνὰ μέσον τῆς νυκτὸς καὶ ἔστωσαν εἰς σημεῖα καὶ εἰς **καιροὺς** *Haī* εἰς ἡμέρας καὶ εἰς ἔνιαθούς”

[And God said, “Let luminaries come into being in the firmament of the sky for illumination of the earth, to separate between the day and between the night, and let them be for signs and for *seasons* and for days and for years”]

This is the only occurrence of *kairos* in Genesis 1, and it is clearly defining the purpose of the lights God placed in the sky on Day 4 of Creation Week, not marking the time passing in Genesis 1 itself.

In the LXX, *kairos* is vastly preferred in translation over *chronos*. Nevertheless, both terms occur often enough for us to observe that 1) both terms have a large semantic range, being used to translate many Hebrew chronological terms. Also 2) Many Hebrew words are translated with both *chronos* and *kairos*, indicating that the semantic ranges of the two Greek words have substantial overlap. The words translated with both *chronos* and *kairos* are *yôm*, *z'mân*, *tôr*, *pä'âm*, *qêš*, and *êl*.

Given the heavy influence of the LXX on the NT authors, one should look first to its usage of the terms in question, rather than Greek (or modern!) philosophy. And we will see that, like the LXX usage, *chronos* and *kairos* in the NT have wide, overlapping semantic ranges.

Chronos and kairos in the same LXX context

When *chronos* and *kairos* appear in the same context, this can be useful to differentiate their meaning and to see any overlap in their semantic range.

2 Esdras 23:31 reads:

“καὶ τὸ δῶρον τῶν ξυλοφόρων ἐν **καιροῖς** ἀπὸ **χρόνων** καὶ ἐν τοῖς βακχυρίοις. μνήσθητί μου, ὁ θεὸς ἡμῶν, εἰς ἀγαθωσύνην.”

[... and the gift of the wood carriers, in *seasons* of the *times* and in the bakchouria. Remember me, O our God, for goodness.]

Daniel 2:21 reads:

“καὶ αὐτὸς ἀλλοιοῖ **καιροὺς** καὶ **χρόνους**, μεθιστῶν βασιλεῖς καὶ καθιστῶν, διδοὺς σοφοῖς σοφίαν καὶ σύνεσιν τοῖς ἐν ἐπιστήμῃ οὖσιν.”

[And he changes *seasons* and *times*; deposing kings and setting up, giving to sages wisdom, and understanding to those who have knowledge.]

Daniel 7:12 reads:

“καὶ τοὺς κύκλῳ αὐτοῦ ἀπέστησε τῆς ἐξουσίας αὐτῶν, καὶ **χρόνος** ζωῆς ἐδόθη αὐτοῖς ἕως **χρόνου** καὶ **καιροῦ**.”

[And he removed those around him from their authority, and *time* of life was granted to them for a *season* and a *time*.]

In each instance, *chronos* and *kairos* are used together to indicate seasons and times. The

Table 2. The use of *kairos* in the LXX. Asterisk indicates Aramaic cognate.

English translation	Hebrew term	LXX reference
Season, time, appointed time	<i>Môed</i>	Gen. 1:14, 17:21; 18:14; 21:2 Exo. 13:10; 23:15; 34:18; Lev. 23:4; Num. 9:3, 7, 13; Deut. 16:6; 31:10; 2 Rgns. 20:5; 4 Rgns. 4:16, 17; Psa. 74:3; 101:14; 103:19; Hos. 2:11; Hab. 2:3; Jer. 8:7; Lam. 1:15; Dan. 8:19; 11:27, 29; 12:7
End	<i>Qêš</i>	Gen. 6:13; Jer. 27:26; Lam. 4:18; Dan. 8:17
Very (that very day)	<i>Êššēm</i>	Gen. 17:23, 26
Time, now, at that time, season	<i>Êt</i>	Gen. 18:10; 21:22; 38:1; Lev. 15:25; 26:4; Num. 22:4; 23:23; Deut. 1:9, 16, 18; 2:34; 3:4, 8, 12, 18, 21, 23; 4:14; 5:5; 9:20; 10:1, 8; 28:12; 32:35; Josh. 5:2; 11:10, 21; Jdg. 3:29; 4:4; 10:14; 11:26; 12:6; 14:4; 21:14, 22, 24; 1 Rgns. 4:20, 9:16; 20:12; 2 Rgns. 11:1; 3 Rgns. 11:4, 29; 15:23; 4 Rgns. 8:22; 16:6; 18:16; 20:12; 24:10; 1 Chron. 9:25 (2x); 12:33; 21:28, 29; 29:30; 2 Chron. 7:8; 15:5; 16:7, 10; 21:10, 19; 25:27; 28:16; 30:3; 35:17; 2 Esd. 8:34; 10:13, 14; 14:16; 16:1; 19:27; 20:35; 23:21, 31; Est. 4:14; Psa. 1:3; 4:8; 9:26; 20:10; 30:16; 31:6; 33:2; 36:19, 39; 68:14; 70:9; 80:16; 101:14; 105:3; 118:20, 126; Prov. 5:19; 6:14; 8:30; 17:17; Eccl. 3:1–8, 11, 17; 7:17; 8:5, 6; 9:8, 11, 12; 10:17; Song 2:12; Job 5:26; 38:32; 39:1, 18; Amos 5:13 (2x); Micah 2:3; 3:4; 5:3 Joel 4:1; Zeph. 3:19, 20; Hag. 1:2, 4; Isa. 8:23; 18:7; 39:1; 49:8; 60:22; Jer. 2:27, 28; 3:17; 4:11; 5:24; 6:15; 8:1, 7, 15; 10:15; 11:12, 14; 14:8, 19; 15:11; 18:23; 26:21; 27:4, 16, 20, 27, 31; 28:6, 18; Eze. 4:10, 11; 7:4, 12; 12:27; 16:8; 21:30, 34; 35:5; Dan. 11:13, 14, 35; 12:4
Now, this time, X times	<i>Pä'âm</i>	Gen. 29:34; 30:20; Exo. 8:28; 9:14; 23:17; 34:23, 24; Deut. 9:19; 10:10; 16:16; 1 Chron. 11:11; 2 Chron. 8:13; Jer. 16:21
Every year	<i>Šanā</i>	Hab. 3:2
Time, occasion	<i>Rêgêl</i>	Exo. 23:14
In due time	<i>T^eqûpāh</i>	1 Rgns. 1:20
Same time / appointed time	<i>Z^emān</i>	2 Esd. 5:3; Dan. 3:7*, 8*; 7:22*, 25*
In the future	<i>Āhārôn</i>	Isa. 30:8
Turn	<i>Tôr</i>	Est. 2:12
Day/days	<i>Yôm</i>	Zeph. 3:16; Isa. 38:1
Forever	<i>Ād</i>	Isa. 64:8
On behalf of	<i>Bā'ād</i>	Ezek. 22:30
Time	<i>Iddān</i>	Dan. 2:8*, 9*, 21*; 7:12*, 25* (4x)

UBS handbook says, “The two nouns in Hebrew^[7] have a rather general meaning, and it is probably unnecessary to try to make a careful distinction between them. ... Rather the two are to be taken together.”⁸ If the two can both be used as general terms that may be ‘taken together’, then the terms cannot be speaking about two radically different types of time, as Dembski’s argument requires.

Ecclesiastes 3:1 LXX reads:

“Τοῖς πᾶσιν χρόνος, καὶ καιρὸς τῷ παντὶ πράγματι ὑπὸ οὐρανόν.”

[For everything there is a *time*, and a *right time* for every matter under heaven.]

The Hebrew uses parallelism, as Hebrew poetry and wisdom literature commonly do. Regarding the underlying Hebrew and the LXX translation, Keil and Delitzsch state:

“The Greeks were guided by the right feeling when they rendered נָחַל by χρόνος, and נֶחַד by καιρός. Olympiodorus distinguishes too sharply when he understands the former of duration of time, and the latter of a point of time; while the state of the matter is this, that by χρόνος the idea comprehends the *termini a quo* and *ad quem*, while by καιρός it is limited to the *terminus a quo*.”⁹

So, we see that while there is distinction in the meaning of *kairos* and *chronos*, they are close enough in meaning that the two terms can be used to meaningfully translate Hebrew parallelism, which would, by definition, require an overlapping semantic range.

Another instance supporting the overlapping semantic range of *chronos* and *kairos* in the LXX: the girls’ ‘turn’ to go in to Artaxerxes is translated with *chronos* in Esther 2:12 LXX, but with *kairos* in Esther 2:15. The original Hebrew in both verses uses the word ‘*tor*’.

Chronos and kairos in the New Testament

When we look at the usage of *chronos* and *kairos* in the New Testament, we see that while the two words can be generally distinguished from each other, there is still a substantial overlap in the semantic range. And, importantly, there is no hint of a special ‘God’s time’ that can subvert the order of cause and effect.

Chronos in the NT

As with many generic words, *chronos* has a wide semantic range when modified with other terms (these phrases are included in brackets in table 1). Luke/Acts has both the most uses of *chronos* and the widest range of meaning for *chronos*, perhaps indicating Luke’s particular emphasis on timing of events.

Some significant usages stand out that challenge the distinction between *chronos* and *kairos*. In Acts 7:17, Luke speaks of “the time of the promise” [*ho chronos tēs epangelias*]. If *kairos* were the exclusive word to speak of ‘God’s timing’, we might expect Luke to use *ho kairos tēs epangelias*.

If *chronos* were used in reference to the time of creation, we would expect something along the lines of *chronos aiōniois*; however, that would not be entirely appropriate, because it talks of long ages past (i.e. the ages before the coming of Christ) or before creation existed.

Kairos in the NT

Generally speaking, *kairos* is chosen when speaking about the *suitable* or *proper* time for something to happen. It can speak of seasons or harvest time, or the eschatological future time of Christ’s return and the judgment of the world. But this should not be taken to suggest that *kairos* is some otherworldly notion of ‘God’s time’. *Kairos* is a concept that has substantial overlap with *chronos*; it can be used to speak of the timing of a particular event without overt reference to its theological import. In Luke 1:20, “the day when these things take place” is equated with “fulfilled in their proper time [*kairos*]”. Hence, *kairos* can refer to a particular day in a human’s conception of time. Perhaps even more problematic for the interpretation that *kairos* must *always* refer to an opportune moment or ‘God’s timing’, it can be used to mean ‘at all times’, which would seem to be close to the categorical opposite.

Furthermore, *nowhere* is *kairos* used to mean ‘God’s time’. Both *chronos* and *kairos* refer to events happening on an earthly timeline, apart from, arguably, *chronos aiōnios*.

Chronos and *kairos* together in the NT

Chronos and *kairos* appear together in contexts that closely match their usage in the LXX. Acts 1:7 reads:

“εἶπεν δὲ πρὸς αὐτούς, Οὐχ ὑμῶν ἐστὶν γινῶσαι χρόνους ἢ καιροὺς οὓς ὁ πατὴρ ἔθετο ἐν τῇ ἰδίᾳ ἐξουσίᾳ,”

[He said to them, “It is not for you to know *times* or *seasons* that the Father has fixed by his own authority.”]

In a similar usage, 1 Thessalonians 5:1 reads

“Περὶ δὲ τῶν χρόνων καὶ τῶν καιρῶν, ἀδελφοί, οὐ χρειάζεστε ὑμῖν γράφεσθαι.”

[Now concerning *the times and the seasons*, brothers, you have no need to have anything written to you.]

While some attempt to differentiate the usage of the terms in this context, most commentators see that by this time the terms had come to be used together in a synonymous manner.¹² As such, it supports the overlap of semantic domain, rather than radical distinction between the two terms.

Table 3. The New Testament usage of *chronos*¹⁰

Usage	Reference
Denotes the timing of an event	Matt. 2:7, 16; Luke 1:57; Acts 1:6
Time, times	Acts 1:7; 3:21; 7:17; 15:33; 17:30; 18:23; 19:22; 1 Cor. 16:7; 1 Thes. 5:1; Heb. 5:12; 11:32; 1 Pet. 1:17; 4:2, 3; Rev. 2:21
A certain number of years	Acts 7:23; 13:18
A long time	Matt. 25:19; Luke 8:27; 20:9; 23:8; John 5:6; Acts 8:11; 14:3; 27:9
So long as	Mark 2:19; Rom. 7:1; 1 Cor. 7:39; Gal. 4:1
How long?	Mark 9:21
A moment of time	Luke 4:5
many times	Luke 8:29
"For a while"	Luke 18:4
A little while	John 7:33; 12:35; Rev. 6:11; 20:3
so long	John 14:9; Heb. 4:7
all the time / the whole time	Acts 1:21; 20:18
no little time	Acts 14:28
a longer period	Acts 18:20
long ages / eternity	Rom. 16:25; 2 Tim. 1:9; Tit. 1:2
fullness of time	Gal. 4:4
last time/s	1 Pet. 1:20; Jude 1:18
delay	Rev. 10:6

"The fullness of time"

Perhaps one of the strongest indications that *kairos* does not have a special meaning of 'God's time' is Paul's use of the terms '*chronos*' and '*kairos*' in identical contexts. In Galatians 4:4 he uses *chronos* in his phrase "the fullness of time":

"ὅτε δὲ ἦλθεν τὸ πλήρωμα τοῦ χρόνου, ἐξαπέστειλεν ὁ θεὸς τὸν υἱὸν αὐτοῦ, γενόμενον ἐκ γυναικός, γενόμενον ὑπὸ νόμον,"

[But when the *fullness of time* had come, God sent his son, born of woman, born under the law,]

But in Ephesians 1:10, the same Apostle writes:

"εἰς οἰκονομίαν τοῦ πληρώματος τῶν καιρῶν, ἀνακεφαλαιώσασθαι τὰ πάντα ἐν τῷ Χριστῷ, τὰ ἐπὶ τοῖς οὐρανοῖς καὶ τὰ ἐπὶ τῆς γῆς ἐν αὐτῷ."

[... as a plan for the *fullness of time*, to unite all things in him, things in heaven and things on earth.]

Paul's usage establishes that the semantic ranges of *chronos* and *kairos* overlap so much that either can be used in constructions in contexts speaking about the most important

Table 4. The New Testament usage of *kairos*¹¹

Usage [phrase]	Reference
Denotes a point of time in the eschatological future / the time of the return of Christ	Matt. 8:29; Mark 13:33; Luke 21:8; 1 Cor. 4:5; 7:29; Rev. 1:3; 11:18; 22:10
The timing of a particular event	Matt. 11:25; 12:1; 14:1; Luke 13:1; Acts 7:20; 12:1; 19:23; Rom. 9:9
Harvest time	Matt. 13:30; 21:34; Mark 12:2; Luke 20:10
Time/s, a period of time	Matt. 16:3; Luke 8:13; 12:56; 18:30; 21:24; Acts 3:20; 13:11; 17:26; 24:25; Rom. 5:6; 13:11; 1 Cor. 7:5; 2 Cor. 6:2; Eph. 2:12; 5:16; 2 Thes. 2:6; 2 Tim. 3:1; 4:3, 6; Heb. 9:10; 11:11; 1 Pet. 1:11; 4:17; Rev. 12:14
Season	Matt. 21:41; Mark 11:13; Acts 14:17; Gal. 4:10
Proper time	Matt. 24:45; Luke 12:42; 1 Pet. 5:6
Denotes the time of Christ's ministry or death	Matt. 26:18; Mark 1:15; Luke 19:44; John 7:6, 8
The present age	Mark 10:30
in their [proper] time	Luke 1:20
an opportune time	Luke 4:13
at all times	Luke 21:36; Eph. 6:18
Epoch	Acts 1:7; 1 Thes. 5:1
the present time	Rom. 3:26; 8:18; 11:5; 2 Cor. 8:14
in due time, proper time	Gal. 6:9; 1 Tim. 2:6; 6:15; Tit. 1:3
Opportunity	Gal. 6:10; Col. 4:5; Heb. 11:15
The fullness of time	Eph. 1:10
A short while	1 Thes. 2:17
Later times	1 Tim. 4:1
The present time	Heb. 9:9
The last time	1 Pet. 1:5
A short time	Rev. 12:12

soteriological events. But both refer to a point in *historical time*, not some type of 'heavenly time'.

When God created

Neither term is used in any creation passage, so what terms are used, and what can that tell us? Well, that neither *chronos* nor *kairos* is used tells us that 'when God created' is a special sort of time, the beginning of the timeline. In fact,

it's called "in the beginning". But it's a beginning *point*, not a beginning *age*. The word 'day' (*yom*, *hēmera*) indicates a quick progression in the creative activity. That these periods of activity are seen as definitional of what days are is a very good reason for concluding exegetically that the Creation Days were actual days—i.e. periods of roughly 24 hours characterized by a cycle of light and darkness.

Failed theodicy

One of the proposed strengths of Dembski's argument is that it allows for Adam's sin to be the cause of death and suffering over long ages, hence preserving Christian orthodoxy while maintaining scientific orthodoxy. However, this suffers from some critical weaknesses.

The analogy is that Christ's death saved those who lived before His death. But Scripture explicitly teaches this, and does *not* teach that Adam's sin had preemptive effects on the creation. And Christ's death itself has a theodicy component—namely, how can a righteous God overlook the sins of the 'righteous' who died before Christ? Dembski's argument *introduces* rather than solves problems. How can Adam's sin *actually* affect the world before he sinned? This would seem to put the significance of a human's action on par with, or even greater than, the significance of Christ's redemptive work. And the teaching of Paul in Romans 5 is that Christ's work is infinitely *greater* than Adam's.

Conclusion

Dembski's argument for kairological time is flawed in almost every possible way. His main source for the distinction between *chronos* and *kairos* is based not in study of the original language of the biblical documents, but in modern philosophy. The words *chronos* and *kairos* are not even in Hebrew, the language the Genesis creation narrative was originally written in. The translation of the Genesis creation narrative in the LXX does not use *chronos* or *kairos*, except for a single use of *kairos* on Day 4 to define the function of the luminaries; the terms are not used to mark the time of creation week.

Furthermore, the Greek terms *kairos* and *chronos* are not starkly different; their semantic ranges overlap considerably. *Chronos*, not *kairos*, is used in the construction *chronos aiwnos* to indicate events that happened 'long ago' without defining when. Additionally, *chronos* can be used to discuss the timing of theologically significant events. In fact, the two words can be used by Paul in *identical* constructions to speak about the timing of the coming of Christ.

If that weren't enough, *kairos* as a special sort of 'God's time' could not be more foreign to its usage in the NT text. While it refers to an 'appropriate' or 'suitable' time, or the timing of seasons, harvest time, and so on, all *kairos* events are located firmly on the earthly 'timeline'. The idea itself

of 'God's time' is not present in Scripture, precisely because God is *outside* of time.

Neither *kairos* or *chronos* is used for 'when God created', because as the event which stands at the *beginning* of the 'timeline', it is 'special'. It is beyond *pro chronōn aiōniōn* (2 Timothy 1:9), it is *en archē*. This specialness does not mean, however, that it stands *outside* of the chronology of Scripture; the language of Genesis 1 clearly establishes Creation Week as the beginning point for chronology.

Since the idea of 'kairological time' is so wrongheaded and contrary to the biblical evidence, why would anyone propose such a solution? Only to attempt a theodicy in light of a long-age hermeneutic. However, this theodicy fails, because *kairos* does not mean what Dembski needs it to mean, and it is not used to describe 'when God created'.

Acknowledgement

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Tremendous erosion of continents during the Recessive Stage of the Flood

Michael J. Oard

The Recessive Stage of the Flood was a time of intense continental erosion. The erosional debris formed the continental margin—a continuous wedge of mostly compacted sediments surrounding the continents. If we can determine which part of this wedge is composed primarily of detritus eroded during the Recessive Stage, some later cementing to sedimentary rock, then estimating the volume of those sediments and rocks could provide a rough quantitative estimate of material eroded from the continents. At present, a total value is not possible, but such an estimate can be made for select areas, providing a methodology that can be expanded to other marginal areas. One such area is the central Appalachian Mountains of the United States and its downgradient continental margin. Research shows an approximate average of 6,000 m of erosion across the Blue Ridge and Piedmont provinces. Another area is the continental margin off south-western Africa. Estimates there show an average 2,400 m of rock eroded off the adjacent continent. Erosion was probably greater in the coastal mountains and plains. Evidence from inselbergs on the coastal plain indicates that this erosional event was as rapid as it was significant. If representative, these studies show that much more sedimentary rocks and sediments existed on the continents than the present average of 1,800 m. Since a large proportion (about 30% or more) of the margin sedimentary rocks are Cenozoic, the Flood/post-Flood boundary must be in the late Cenozoic, assuming the geological column is an accurate chronostratigraphic representation of the rock record.

The Recessive Stage of the Flood was a period of significant continental-scale erosion.^{1–3} It was likely composed of two phases, the Ablative or Sheet Flow Phase followed by the Dispersive or Channelized Flow Phase.⁴ Thus, channelized erosional features would be superimposed upon the sheet flow eroded features. This prediction is borne out in many places, including the south-west Colorado Plateau of the USA (figure 1), which shows large-scale planation, followed by dissection into canyons and valleys. The first type of erosion has been called the *Great Denudation* in which an average of about 3,000 m of sedimentary rock was eroded from the south-west Colorado Plateau, leaving behind a vast planation surface (figure 2).⁵ The eroded volume there is within the estimated 2,500 to 5,000 m of average erosion for the whole Colorado Plateau.⁶ The second erosional event is called the *Great Erosion* with Grand Canyon and Zion Canyon, Utah, being examples of dissection, corresponding to the more channelized erosion late in the Flood.⁷ But this erosion was not limited to the Colorado Plateau. When Flood water flowed from the continents into the newly deepening ocean basins, the same kind of erosion probably occurred. Equally significant volumes of rock were eroded from other areas, as shown by: erosional remnants, such as Devils Tower⁸; eroded anticlines, such as the San Rafael Swell⁹ on the north-west Colorado Plateau (figure 3); and great Coastal Escarpments, such as the 3,500-km-long escarpment that rings southern Africa.¹⁰ This escarpment is about 3,000 m

high in south-eastern Africa, but only about 1,000 m high in south-western Africa.

The sediment eroded would have been transported downgradient, and deposited at places where the flow velocity dropped quickly, typically due to a major depth increase in the water—conditions met almost universally along the continental margins. The continental margin consists of the continental shelf, slope, and rise (figure 4), and is composed of a continuous wedge of mostly sediments around all the continents and even large islands. It is one of the most significant geomorphological features on our planet. The sediments in the continental shelf reach 20 km or more in thickness (about 30% of which is likely Cenozoic), but vary in both lateral extent and thickness, depending on the location. These sediments were most likely deposited by sheet flow off the land. Later, after the bulk of sediments had been deposited, channelized erosion was caused by strong currents that swept in wide channels across the sedimentary surface and eroded submarine canyons.^{11,12}

If the continental margin is composed primarily of sediments deposited in this manner, then the volume of this wedge is approximately the volume of rock eroded from the continent. While some of this margin sediment may have been deposited early in the Flood, at this point the amount would be difficult to estimate. We cannot simply assume Cenozoic sediments are from the Recessive Stage and pre-Cenozoic sediments are from the Inundatory Stage. Moreover, these time periods are labels applied to the

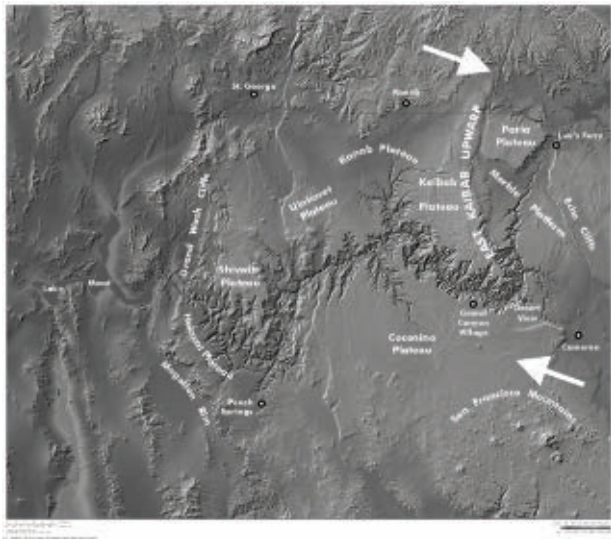


Figure 1. Map of Colorado Plateau and its surrounding provinces. Grand Canyon is on the south-west portion and the San Rafael Swell on the north-west portion of the plateau (map background provided by Ray Sterner and drawn by Peter Klevberg). Arrows point to low areas across the northern Kaibab Plateau and its extension south of Grand Canyon on the eastern margin of the Coconino Plateau.



Figure 2. Planation surface in the Grand Canyon area (view north). North rim of Grand Canyon in the background.

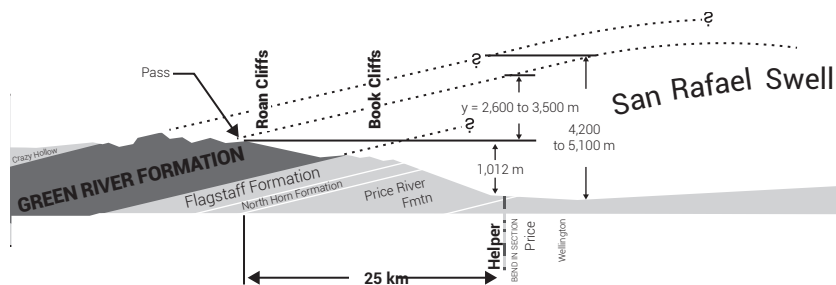


Figure 3. Estimate of 4,200 to 5,100 m of erosion on the north limb of the San Rafael Swell, north-western Colorado Plateau, based on trigonometry and adding the height of erosional remnants at the top Green River Formation (drawn by Peter Klevberg)

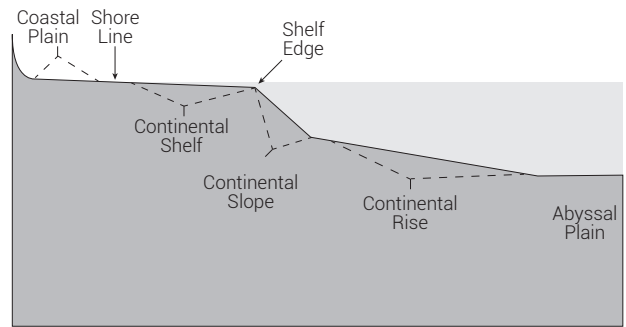


Figure 4. The continental margin consisting of the shallow continental shelf, the steep drop-off of the continental slope, and the gradual decrease in slope of the continental rise (drawn by Melanie Richard)

sediments assuming the geologic column and plate tectonics, e.g. the Atlantic opening up in the Jurassic and Cretaceous.

Nonetheless, given quantified areas of erosion, average thickness values can be calculated for the total amount eroded during the Flood, and minimum estimates for the Recessive Stage can be given by approximations of the Cenozoic sediment thicknesses. However, the total amount of sediments in the margins is currently not known, though scientists are getting closer to being able to estimate it.¹³ Still, the world totals will be difficult to estimate; the sediment volume of the Arctic Ocean sediment margin, for example, is unknown and difficult to measure. But it is possible to apply an estimating method to areas where data provide more constraints.

Estimated erosion from the central Appalachians, USA

The Appalachian Mountains of eastern North America run from Newfoundland, south-east Canada, down the Atlantic seaboard, 2,400 km, into central Alabama. There are distinct physiographic provinces in the southern and central Appalachians from east to west: the Piedmont, the Blue Ridge Mountains, the Valley and Ridge, and the Appalachian Plateau (figure 5). In New England and Canada, the Appalachians are generally characterized by exposures of uplifted crystalline rock.

In addition to estimating the volume of sediments in the continental margin, depth of erosion can be roughly indicated by the rank of coal now at the surface.^{14–16} Coal is commonly found in the sedimentary rocks in the Valley and Ridge Province. This coal is mostly high-rank anthracite and medium-rank bituminous coal.

Friedman and Sanders believe that the anthracite coal in the Catskill Mountains of New York indicates that about 6,400 m of rock has been removed there, assuming the persistence of the current temperature gradient.¹⁵ The same method can also be applied in sedimentary rocks west of the Blue Ridge Mountains, where anthracite is also found near the surface. However, if the temperature gradient was higher when the coal formed, less overburden would have been present to form coal and erode.¹⁴ This could occur during Flood deposition in deep basins if the temperatures started hot, but I will assume the present geothermal gradient as a first approximation. Since bituminous coal has a lower rank than anthracite, overburden would have presumably been substantially less in those areas. Even so, it is not unreasonable by this method to project the erosion of thicknesses of sediments and rock to between 4,000 to 6,400 m from atop the Valley and Ridge Province.

Keeping this figure in mind, let us turn to the volume of sediments found in the continental margin. Geologists believe that these sediments were derived from the Appalachians.¹⁷ In a Flood scenario, this erosion would mostly have occurred during the Recessive Stage.^{17,18} Poag and Sevón state: “The primary forcing mechanisms considered have been tectonic and isostatic uplift and subsidence”¹⁹ The total amount of differential vertical motion between the Appalachians and the basement below the continental margin sediments is believed to have reached 14 km!²⁰ Isostatic uplift—a secondary tectonic force caused by the removal of overburden—would have added to the tectonic uplift in areas being eroded, and would have added to subsidence in areas receiving sediments.

Fortunately, the continental margin in the central-eastern United States has been intensely studied by geophysical and direct drilling methods into the top layers. Poag and Seven indicate that the total amount of siliciclastic (non-carbonate

and non-‘precipitate’) sediment offshore is 1.377 million km³ (about 33% of it Cenozoic) over an area of about 500,000 km² between latitudes 36° and 42° N and longitudes 39° 30’ and 78° W.¹⁷ This estimate includes the continental rise that stretches far to the east of the coastline. The average thickness in this area is 2,700 m. Non-clastic sediments such as carbonates, salt, and gypsum were omitted, granting that they were directly deposited chemically or biologically from the water, and not eroded from inland areas. However, in the Flood model, these chemical sediments may have been eroded from the continents first. If we include these chemical sediments, the estimated average thickness of margin sediments likely would be about 3,000 m.

The central Appalachians, from the Piedmont west to the Valley and Ridge Province, cover an area of around 315,000 km² between 36° and 42° N latitude.¹² Based on the total volume of sediments and sedimentary rock in the continental margin wedge, assuming west-to-east water currents, and assuming that all that sediments originated from those provinces, the most general calculation reveals that an average thickness of about 4,400 m was eroded from this region. The assumption that erosion and deposition

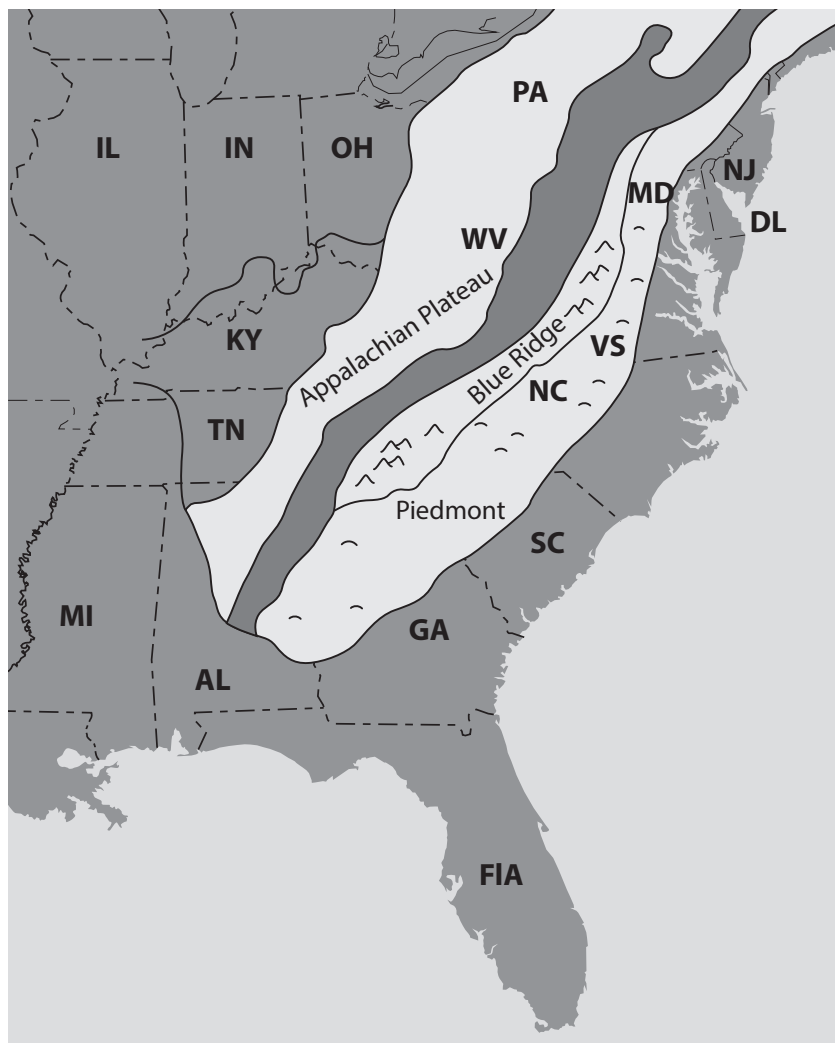


Figure 5. Map of the eastern United States showing the location of the Piedmont, Blue Ridge, Valley and Ridge, and Appalachian Plateau provinces (drawn by Melanie Richard)

was west to east is probably a good assumption because the strong uplift of the eastern United States relative to the offshore area would result in strong water currents flowing east. The continental margin sediments are still thick south of 36°N and north of 42°N. So, I will assume any north-south component would not be significant.

It is probable that most of the sediments offshore would have originated from east of the Appalachian divide, which is mostly in the Blue Ridge Mountains, because erosion would have greatly accelerated during uplift of the eastern United States during the Flood. If all the sediments originated east of the divide, a maximum estimate, the eroded area would have been reduced by approximately 30%, and the eroded thickness of the remaining area would have averaged around 6,000 m. This range agrees well with the range derived from coal rank studies in the Valley and Ridge Province.

Most of the erosion of the central Appalachians appears to have happened along the continental divide in the Blue Ridge Province, and in the Piedmont Province just to the east. These provinces consist almost entirely of exposed igneous and metamorphic rocks stripped of overlying Flood sediments. To the west, the Valley and Ridge Province has clearly been eroded, but retains significant sedimentary thicknesses in the Appalachian Basin, with strata exceeding 10 km today. If erosional estimates are reasonable, sedimentary rocks in this basin may have once reached 14 to 16 km in thickness with 4 to 6 km being eroded during Walker's Zenithic Phase and the Recessive Stage. So, it is likely that the original Appalachian Basin extended east to the eastern edge of the Piedmont. The presence of basement igneous and metamorphic rocks in the Blue Ridge and Piedmont provinces suggests more intense erosion in those areas, suggesting that much of the continental margin sediments were derived from both overlying sedimentary rocks and some deeper igneous and metamorphic rocks. This erosion formed a rough planation surface on the Piedmont Province²¹ which was later dissected during the Channelized Flow Phase. Also, hundreds of water and wind gaps throughout the Blue Ridge and Valley and Ridge provinces were carved by channelized erosion.^{22,23}

The reader may wonder how so much erosion can occur during Flood

runoff. Erosion is related to the bed shear force, which is proportional to the 4th power of the velocity.²⁴ So, if velocity doubles, the bed shear force increases by 16. If the velocity quadruples, the bed shear force increases by about a thousand times. The great differential vertical tectonics between the Appalachians and the offshore basement would greatly accelerate the water flow off the continent and cause massive erosion.

To understand the extent of the erosion during the Recessive Stage of the Flood, we can look at the present topography. The highest elevation in the present Appalachian Mountains is Mount Mitchell, in western North Carolina, which reaches 2,037 m, exceeding Clingman's Dome in eastern Tennessee by 12 m. Most of the peaks in the Appalachians today are much lower. So the late-Flood erosion being discussed removed up to three times the present day relief. Various factors could have affected both past and present elevations, but it is clear that a significant percentage of the rock record formed in this region was eroded during the latter stages of the Flood.

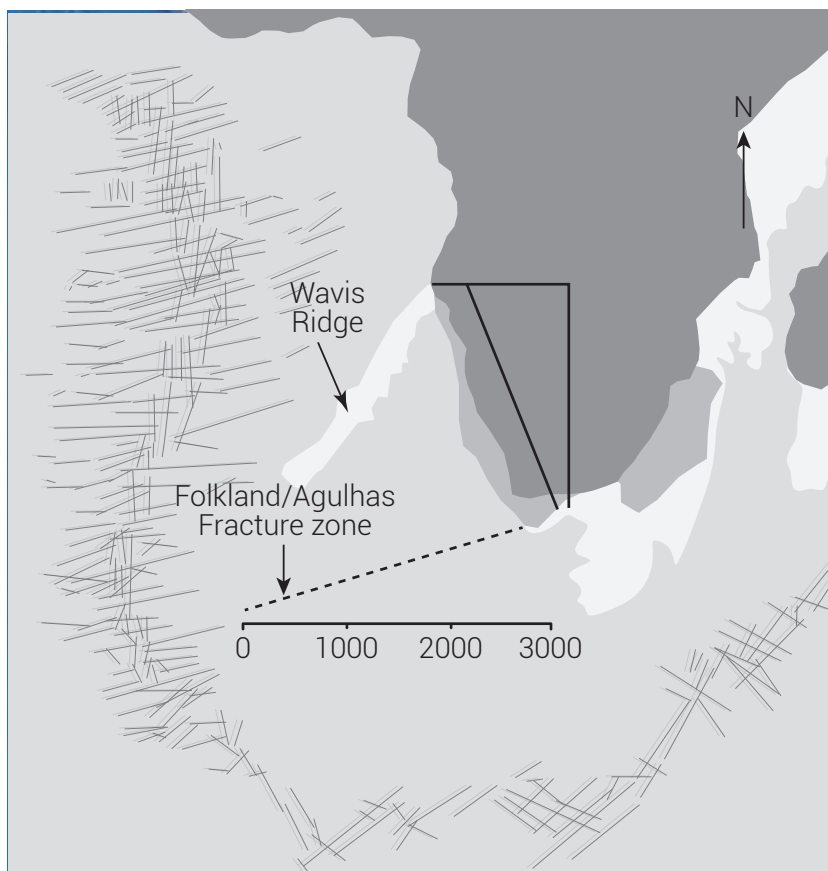


Figure 6. Map of southern Africa and the adjacent oceanic margin (drawn by Melanie Richard). Large arrows show direction of runoff during the uplift of southern Africa. Lines in south-west Africa show the two areas of estimated continental erosion of south-west Africa. Scale in kilometres.

Estimated erosion from south-west Africa

Although the coal rank technique has not been applied in south-west Africa, an estimate of erosion can be obtained from the volume of the continental margin sediment wedge (figure 6). Data from wells and geophysical surveys have allowed scientists to estimate the amount of marginal sediments off Namibia and western South Africa.²⁵ Their goal was to expand their work to the entire continent, starting from this test region. They confined their area of interest to that between the submarine Walvis Ridge to the north and the Falkland/Agulhas fracture zone that impinges on the southern tip of Africa. Fracture zones commonly are the result of uplift of a ridge adjacent to a deep trough. These ridges would likely block much of the sediments coming from the north or south, and, therefore, provide a reasonable estimate of continental erosion from south-west Africa.

Sediments of the continental margin here especially occur in several deep basins. The Walvis and Orange basins are situated largely beneath the continental shelf, and contain up to 8,000 m of sediments.²⁵ Based on geological cross sections of the margin, these sedimentary rocks thin rapidly offshore, pinching out about 1,000 km offshore.²⁵ These two basins are approximately 1,500 km long, running north-south. The estimated area of deposition between the Walvis Ridge and the Falkland/Agulhas fracture zone is about 1.5×10^6 km² and the average thickness of the margin sediments is approximately 3,200 m. The top 33% of the sediments are dated as Cenozoic, while the majority of the sediments are Jurassic and Cretaceous, by uniformitarian scientists. However, for our purposes here the dates do not matter, since they may be quite arbitrary. It is likely that these basins started to form at the peak of the Flood, the Zenithic Phase, and continued through the Recessional Stage, when strong differential vertical tectonics occurred between the continents and the ocean floors,²⁶ which would stretch and fracture the transitional crust.²⁷ Such is the case on the East Coast of North America,²⁸ as well as off south-west Africa. So, as a first estimate, I will assume that most of the margin sediment was deposited during the Recessional Stage of the Flood.

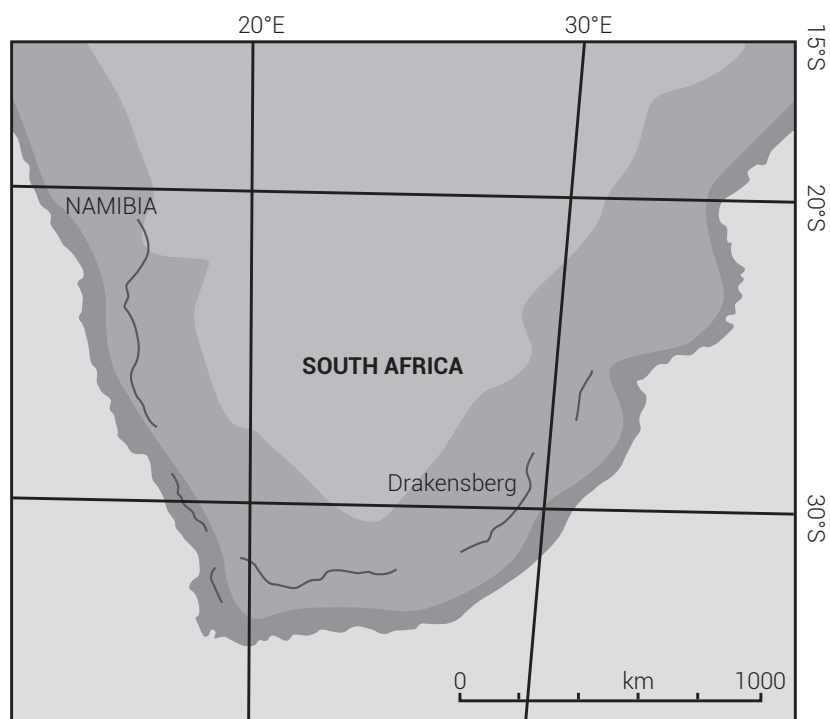


Figure 7. Plan view of the Great Escarpment with some large gaps that parallels most of the coast of southern Africa between 100 and 160 km inland for 3,500 km (drawn by Melanie Richard)

Estimating offshore sediments

Geologists today apply the plate tectonic paradigm to their work, and estimates of continental margin sediment volume were calculated by assigned time period starting in the Upper Jurassic. Although the 'time' South America supposedly broke away from Africa is the Lower Cretaceous, there are synrift sediments that were deposited during active rifting in the upper Jurassic.²⁵ But a total volume can be derived by simply adding the time-specific volumes they provide. Volcanic rocks and carbonates are not included in the calculation because they were assumed to have formed *in situ* and not from continental transport and erosion. The total volume of eroded siliciclastic rocks from the continent is about 3.7×10^6 km³ (of which about 1.2×10^6 km³ is dated Cenozoic).

This is a conservative estimate of bulk sedimentation because although the volcanic rocks were obviously formed *in situ*, most of the carbonates were probably eroded from the continents and redeposited offshore. These carbonates likely precipitated *in situ*, but the original carbonate probably originated from eroded continental deposits and dissolved in the runoff. The amount of carbonate rock is roughly 30% that of the siliciclastic sedimentary rocks.²⁵ If the carbonates are added back in, the total volume eroded from south-west Africa is around 4.8×10^6 km³.

Estimating erosion from southern Africa

We know less about the erosion from this area of southern Africa than we do about the central Appalachians, but a rough estimate of the area and average depth of erosion from south-west Africa is possible. During continental uplift and/or sinking of the ocean basins or both, the continent experiences deformation, forming domes and basins.²⁹ Widespread early erosion formed a planation surface called the African Surface.³⁰ In south-west Africa, the Great Escarpment lies about 100 km inland, and separates two planation surfaces: a coastal plain and an inland planation surface (figure 7). Farther east lies the Kalahari basin or inland plain, between the elevated plateaus of south-east Africa and that of Namibia and western South Africa. The coastal areas of south-east Africa are quite high, forming the Drakensberg escarpment about 3,000 m high.

The method follows that used for the Appalachians. Since the south-west African escarpment is not that high, I will estimate the amount of erosion from the west slopes of the Drakensberg westward between the Walvis Ridge and the Falkland/Agulhas Fracture Zone. The Walvis Ridge approaches the coast at about 20°S, while the Falkland/Agulhas Fracture Zone comes close to the southern tip of South Africa at 35°S. I will also assume east-to-west water currents perpendicular to the coast caused by continental uplift relative to the ocean basin to the west. This area is approximately $2 \times 10^{12} \text{ m}^2$. When we divide the total

amount of sedimentary rock and sediment offshore by the area eroded, we get an average of 2,400 m. There will likely be more intense erosion nearer the coast causing the Great Escarpment. This is because it was the locus of change for the new flow gradient, and acceleration of the eroding waters would have been rapid there.

Evidence for rapid erosion

During this erosive stage of the Flood in Africa, a continent-scale planation surface, called the African Surface, was created, broken by local domes and basins created by differential uplift.^{29,30} Planation surfaces, especially of this magnitude, are not forming today.^{11,12,31} Therefore, they cannot be explained by uniformitarian geomorphology. It is a powerful argument for the Flood because its Recessive Stage predicts the large-scale erosional features—both from sheet erosion and channelized flow—that we see today.

Although the Recessive Stage of the Flood lasted for months, initial rates of erosion (more closely tied to flow velocity) could have been much more rapid. As the coastal escarpment of south-west Africa, around 1,000 m high, eroded, it likely migrated inland over 100 km from where it started near the coast.¹² Given that the Great Escarpment rings southern Africa for 3,500 km, the volume eroded from near the coast to the location of the Great Escarpment is quite



Figure 8. Sunrise at Spitzkoppe, a 600 m tall inselberg on the coastal planation surface in the Namibia Desert, Africa (from Wikipedia)

large. The erosion is too much and too fast for the usual uniformitarian estimates.³²

The coastal planation surface in the Namibian Desert has numerous granite inselbergs surrounded by basal pediments, similar to the Piedmont east of the Blue Ridge Mountains.³³ An inselberg is an erosional remnant that generally rises above a planation surface. The most famous inselberg in south-west Africa is Spitzkoppe, which rises 600 m above the desert floor (figure 8). Its height provides a minimum estimate of the depth of erosion in that area. Spitzkoppe is composed of granite. Since granite is plutonic, it was most likely covered by a significant amount of overburden, which was also eroded. Thus, we know that at least 600 m, and most likely much more, was eroded from the Namibian Desert.

Today, the vertical slopes of Spitzkoppe are eroding by means of cliff retreat toward the centre of the inselberg. The rate was recently measured and was found to be two to three times faster than the rate of the nearly horizontal pediments. This is not surprising since steep slopes erode much faster than horizontal surfaces.³⁴ But this raises another question: why would an inselberg like Spitzkoppe persist over geologic time? The creation of tall inselbergs requires *rapid* erosion by a catastrophic flow of water, and the persistence of these features requires a limited amount of time since their formation. Both are problems for uniformitarian geologists.¹² Moreover, numerous inselbergs exist on all continents,¹² indicating a global catastrophic event.

Implications

These calculations demonstrate how the Flood model both predicts the existence of characteristic geomorphic and geologic features, and then provides a basis for calculations that some uniformitarian geologists cannot make, because their paradigm excludes thought along those lines.

The most obvious demonstration of the superiority of the Flood model is the explanation of the vast volumes of eroded rock and sediment from the continents during the Recessive Stage of the Flood. Erosion rates would have been almost unimaginable at their maximum. The Flood model predicts not only continent-scale erosion, but the geographic locations of maximum erosion—i.e. at the maximum change in gradient caused by the relief between the continents and ocean basins. It also predicts the deposition of transported materials at the point where the change in water depth caused the current velocity to drop abruptly, creating the continental margin sediment wedge. These wedges are ubiquitous and their relative volumes provide indications of where erosion and deposition was greater, and where it was less. This can assist us in our understanding of how much material might have been removed from adjacent areas, and how large the affected areas might have been.

And obviously, estimates of Flood sediment thickness on the adjacent continental crust, like at the San Rafael Swell, USA, help constrain the volume of eroded sediment transported to the continental margins. Values for the central Appalachians and south-west Africa do not represent average continental erosion, but do provide some scale against which it could be estimated. The average depth of sedimentary rocks on all the continents is estimated to be 1,800 m.^{35,36} That seems quite large until it is compared to the thicknesses eroded and deposited along the continental margins, or in areas such as the Colorado Plateau, USA, where estimates of thickness eroded have been made by secular geologists. It is not unreasonable to suggest that the average thickness of sedimentary rocks on the continents just before the Recessive Stage may well have been 50% more than now.³⁷

Another implication concerns the location of the Flood/post-Flood boundary. Erosion and deposition on the scale observed on the continental margins could only have happened in the Flood. These findings suggest that the Flood could not have ended until the late Cenozoic. For example, the sediments off the East Coast of the United States are estimated to have a total volume of 1.34 million km³. Of that, about 33% are dated as Cenozoic, which is a large percentage, making it unlikely that the Cenozoic sediments can all be explained by post-Flood catastrophism.²⁰ It is likely that even the Mesozoic sediments on the continental margins are from the Recessive Stage, but this refinement is beyond the scope of this paper. Likewise, the thick continental margin sedimentary wedge in the northern Gulf of Mexico contains about 12 km of Cenozoic sedimentary rocks.³⁸ Thick Cenozoic sedimentary rocks are found along other continental margins, strongly indicating that the Flood/post-Flood boundary is in the late Cenozoic.

If so much erosion occurred on the continents late in the Flood, then it is an inescapable conclusion that much of the surficial sedimentary rock we see, even that dated as very ‘young’, such as Cenozoic, is actually ‘older’ than where it has been assigned. That is, some is likely from the late Inundatory Stage, the Zenithic Phase, as the Flood was reaching its peak. There are exceptions, of course, but those do not lessen the force of this conclusion. It appears that Flood sedimentation on the continents was highly non-linear, with most of what we see preserved today having been deposited in the earlier stages of the Flood.

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Can biologically active sequences come from random DNA?

Robert W. Carter

A recent report that random DNA sequences can be a source of biological novelty is being used to support evolution. The authors concluded that biologically important novelty was trivial to generate. However, they drew multiple premature conclusions from their work, and they made no attempt to correlate their sequences with known biological function. In this follow-up study, the standard sequence comparison tool BLASTn was used to probe for similarities between their random sequences and the *E. coli* genome. In most cases, a 20–40-bp section was identified that had a high degree of similarity (up to 100%) to a small portion of a known *E. coli* gene. In the majority of cases, the random DNA ran in the reverse direction from that of the gene. This strongly indicates that a specific subsection of the RNA transcript, and not the protein product of the randomized DNA, was the active agent. This size range resembles that of many biologically active RNA molecules, specifically microRNAs, that are known to have a major influence in regulating expression of many different genes. There is no evidence here that random DNA supports evolutionary theory. Instead, random RNAs inserted into the cell help us learn about the amazing complexity of genetic regulation.

Recently, *Biologos*¹ fellow Dennis Venema reiterated the common evolutionary claim that new biological functions can easily arise from random mutation.² As his first example, he used the *nylonase* gene. For several decades, evolutionists have been claiming the existence of the *nylonase* gene as *prima facie* evidence for evolution. The fact that a bacterium was able to ‘evolve’ the ability to digest a man-made polymer in just a few years was seen as a triumph of evolutionary predictions. But the early claims that attempted to describe how the gene arose fell short of reality. Instead of a ‘frame shift’ in a gene that caused the new ability to arise, an enzyme that already had the ability to digest similar molecules was fine-tuned by the bacterium to break the nylon bond. But this was done in a copy of the original gene on a plasmid. The original was left untouched.³ Since some bacteria already had the ability to degrade a similar bond (the amide bond found in all proteins), and since the enzyme already had a limited ability to degrade nylon, it only took a few minor changes in the backup copy of the enzyme to allow for more efficient nylon degradation. Thus, the *nylonase* gene is much better suited to supporting design arguments than to supporting evolution in general.

However, Venema brought up a second example, which comes from new research, where the experimenters supposedly found a high frequency of biologically active properties in random DNA sequences. An analysis of this new study will be the focus of this paper. But Venema shows his bias by asking, “Just how easy is it to obtain a functional gene from random DNA sequence? And consequently how likely is it that *de novo* gene origination is a common occurrence?” In both sentences he uses the term ‘gene’ without grappling

with the nuances of the modern concept of genes and genetic information. Is it true that a random sequence, when inserted into a cell, has the capacity to take on the role of a ‘gene’?

The authors of the study under question, Neme *et al.*, state, “Intriguingly, the highest rates of *de novo* emergence are always found in the evolutionarily youngest lineages.”⁴ This defies evolution, for it would mean that evolutionary rates are speeding up over time. Using circular logic, they are claiming that more ancient sequences evolve more slowly because they are more conserved.⁵ This does nothing to help their argument that new function can arise easily from random DNA and illustrates how our opponents often play fast and loose with important concepts and definitions.

In their study, Neme *et al.* generated millions of random 150-bp DNA sequences and inserted them into a bacterial plasmid. They then induced *E. coli* to absorb these plasmids. The plasmid carries an ampicillin resistance gene so any non-transformed bacteria would die when grown in the presence of the antibiotic. It also carries an inducible promoter that would turn on transcription of the random DNA sequence when exposed to IPTG.⁶ The plasmid also carries a built-in stop codon. This guarantees that a protein with a randomized centre comprising 50 amino acids would be made after the gene was transcribed. This is about the size of a typical protein domain, but note that evolution must explain how entire proteins evolve, not just disconnected subsections of proteins. Also, three of the 64 codons are stop codons; thus, stops should occur every 21.3 bases on average. Therefore, most of their sequences would not have been expected to produce a full-length protein.

When grown in mixed culture, they were surprised to discover many clones, the growth rates of which were affected by the presence of the random DNA. Although most of the random DNA sequences they scored caused a decrease in growth rate, some did the opposite. They took this to indicate that some of the random sequences affected the cells enough that selection (either purifying or positive) could have acted upon them.

The experiment is ingenious, and, as an intellectual exercise, reveals intriguing lines for future enquiry. Technically, they did nothing wrong. However, they made several critical errors when attempting to extract evolutionary connotations.

Their first error was one of applicability. We know that nothing in life produces truly random sequences, and no part of evolutionary theory (after the origin of life) starts with randomized nucleotides. The typical protein consists of multiple interspersed functional domains and disordered regions.⁷ This does not mean the intrinsically disordered regions (IDRs) have no function, however; they are involved in multiple important cellular processes from affecting protein folding to influencing protein assembly. IDRs also have distinct compositional biases (i.e. they have more charged and polar amino acids and fewer amino acids with bulky hydrophobic groups). They are not truly ‘random’ (see previous reference for a detailed discussion) and should not serve as a source of truly random DNA for evolutionary purposes. Unlike humans and higher organisms, bacteria have little ‘junk DNA’,⁸ so this cannot be the source of new functional novelty.

Second, the authors failed to address how much time would be required to sample these random sequences in real life. Sanford *et al.* studied how long it would take a random functional string to appear in a human-like population.⁹ Their model results indicate that it would take approximately 84 million years for random mutation to produce, and for natural selection to fix, even a strongly favoured 2-nucleotide string. It would take more time than the history of life on Earth to fix a 6-nucleotide string.¹⁰ In a similar vein, O’Micks studied the evolution of bacterial gene promoters via random mutation and concluded it was virtually impossible.¹¹

This ‘waiting time problem’ is a significant hurdle for evolution to cross. Bacteria like *E. coli* have much shorter generation times and much higher population sizes than humans, and so might be able to experiment with much more random DNA over time. Yet, Neme *et al.* made no estimate concerning how much time this might take, even allowing for the sudden appearance of 150-bp random sequences that can be transcribed and translated in the cell.

Third, the sequence space they explored was probably orders of magnitude greater than what life could ever experience. There are four nucleotides in DNA, thus the

potential for 4^{150} ($>2 \times 10^{90}$) theoretical sequences 150 nucleotides in length. Since they were dealing with μg quantities of DNA, they did not even begin to exhaust the possibilities. However, they did test tens of millions of different sequences.¹² Also, most genes do not have to be perfect to manufacture either a functional RNA or protein. Thus, they may have sampled a much greater proportion of protein or functional RNA space than one might assume at first.

To develop these thoughts further, another standard laboratory procedure needed to be applied to their sequence data, one which is available to them, yet they curiously failed to perform: BLAST.

Methods

In their supplementary information, Neme *et al.* provided a list of 713 random 150-bp sequences (and the 50-amino-acid translated proteins) they determined were biologically active. They also flagged each sequence ‘up’ or ‘down’ to indicate whether it would have a positive (+) or negative (–) effect on bacterial numbers over time. They cloned the random sequences into a specific plasmid vector, leaving a DNA sequence with this formula:

ATGAAGCTTAGC...N₁₅₀...GCATTGGTCGACTACAAGGACGATGACGACAAGTGA

where N₁₅₀ represents the 150-bp randomized DNA sequence. This translates into a protein with this formula:

MetLysLeuSer...AA₅₀...AlaLeuValAspTyrLysAspAspAspAspLysSTOP

where AA₅₀ represents the randomized string of 50 amino acids.

In their paper, they reported analyses on a small subset of the active sequences. Specifically, they tested the activity of clones 3 (+), 8 (+), 53 (–) and 119 (–). They also assayed clones 4 (+), 32 (+), and 600 (+) in competition experiments. They did not include clone 600 in the sequence list, for unexplained reasons. Clone 605 was used here instead, since they listed it as ‘similar to 600’.

The >700 biologically active clones Neme *et al.* listed should not have been in any particular order, so the first 10 ‘up’-regulating and the first ten ‘down’-regulating clones were treated as a representative sample. I also examined all seven of the clones they specifically assayed in competition experiments. I searched for similar sequences among these 27 clones using the standard BLASTn tool (v. 2.6.1).¹³ There are many different parameter settings that affect BLAST results, but, knowing that they used short sequences with potentially little similarity to living things, and after some experimentation, I set the Expect Threshold to 20 (higher than normal) and the Word Size to 11 (smaller than normal) to account for these difficulties. At low word sizes, the

trailing FLAG sequence received many hits due to the popular use of this vector in many different studies, so the leading and trailing plasmid vector sequences were trimmed prior to any reported BLAST search. I used BLAST directly on the *E. coli* genome first. To broaden the applicability of these results, I also used BLAST against a set of curated diverse genomes (refseq_representative_genomes). I also used the random sequence generator at bioinformatics.org¹⁴ to create multiple random nucleotide strings 150 to 1,500 long. This was done to create a set of random sequences that were not first filtered for activity in *E. coli*. After a few initial trials, I opted to not search the entire NCBI nucleotide collection (with the exception of the longest random string) because this generates many non-biological, engineered, and duplicate hits. The purpose was not to identify every biological sequence that matched these random sequences, but only to identify and characterize a few high-scoring matches, if they existed.

Results

Neme *et al.* claimed their random sequences were synthesized as “equimolar mixes of A, C, G, and T at every position”, but we do not know if they validated this. The 713 biologically active sequences they reported had decidedly non-random nucleotide frequencies (figure 1). An even distribution would mean all nucleotides should have a frequency of 0.25, but the reported sequences were rich in G (0.33 \pm 0.03 SD) and depauperate in A (0.18 \pm 0.03 SD). The other two nucleotides were exactly at expectation (0.25 \pm 0.04). They did not perform this simple measure and may have noticed something was amiss if they had. Instead of ‘random’ sequences showing functionality, the ‘biologically active’ sequences had highly skewed nucleotide ratios, indicating that something decidedly non-random was occurring with the *E. coli* populations that carried these sequences.

They did not analyze the nucleotide composition of their clones, but they did perform an analysis on amino acid frequencies. Since one of their (and Venema’s) assumptions was that the synthesized proteins would be the active agents in their assay, they incorrectly state that the amino acid composition provides “potentially more information than nucleotide composition of the underlying RNAs”. They found no significant differences from random expectations, but they did note that specific amino acids were less common (E, I, N, Q, and T) or more common (C, D, G, R, and S) in the random sequences than in *E. coli*. This pattern does not match that found in IDRs (see Discussion). After adjusting for codon frequency,¹⁵ I calculated the nucleotide frequency within the

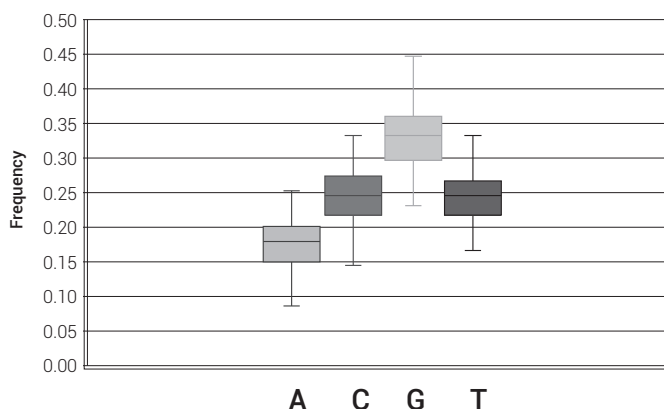


Figure 1. Box-and-whisker plot of the nucleotide frequencies within the 713 biologically active random sequences reported by Neme *et al.* The mean is represented by the horizontal line within the box. The data are divided into quartiles, represented by the top and bottom edges of the boxes and the top and bottom ends of the whiskers.

64 codons used in *E. coli*. I then calculated the nucleotide frequency of the codons for the amino acids that were more and less common than expected. The results were an exceedingly close match to that of the nucleotide composition within the clones. That is, the codons for the amino acids that appeared at higher-than-expected frequencies had less A and more G than average, and vice versa (table 1). Thus, the amino acid composition in the putative protein products was a simple function of the uneven nucleotide composition in the random sequences. This is evidence that the random sequences are acting on the RNA/DNA level.

The very first BLAST search produced a startling result: clone 2 contains a 27-bp subsection of the *E. coli* sensor histidine kinase gene (figure 2). This gene happens to be involved in citrate metabolism.

The text output of a search includes information on the organism and/or strain name, where the match occurs along the search and target string, and in which nucleotides are identical. In this case, 24 of the 27 nucleotides (89%) are identical between the two (figure 3):

Table 1. The expected usage of each of the four nucleotides in the proteins coded in the biologically active random DNA sequences, after adjusting for codon usage. The first row shows the frequency of each nucleotide among all codons in *E. coli*. The second row shows the frequencies among the amino acids specifically flagged as less abundant (R, D, C, S, and V) in *E. coli* compared to the random sequences. The third row shows the frequencies among the amino acids specifically flagged as more abundant (N, E, Q, I, and T).

table a	f(A)	f(C)	f(G)	f(T)
All codons in <i>E. coli</i>	24.2%	25.5%	25.9%	24.4%
Less common in <i>E. coli</i>	12.8%	14.8%	45.2%	27.2%
More common in <i>E. coli</i>	47.3%	27.0%	10.4%	15.3%

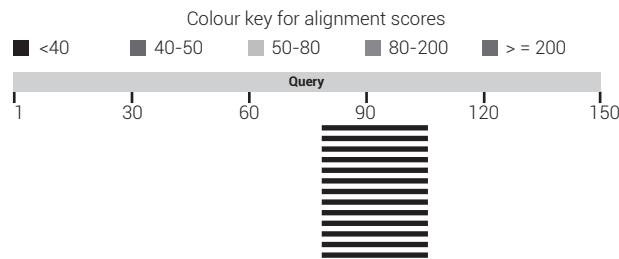


Figure 2. Graphical results for a BLAST search comparing clone #2 (the first clone in the database) against *E. coli*. The genomes of multiple *E. coli* strains are in the NCBI database, hence the multiple identical hits. This small 27-bp segment is part of the sensor histidine kinase gene that is involved in citrate metabolism.

The gene in question is on the antisense strand. Thus, compared to the search string, the gene runs in the *reverse* direction and the short protein produced by clone #2 should have nothing to do with the full-length sensor histidine kinase protein (the alignment of the two sets of codons are also off by one nucleotide). However, the short RNA produced during the transcription of clone #2 will have strong affinity for the double-stranded DNA within this portion of the gene, potentially affecting its regulation.

When expanding the search to include a list of representative genomes curated by NCBI, portions of this clone can be seen in diverse organisms. The first search brought up hits from 30 different bacterial and one fungal species. This was reduced to high-scoring hits only, from four bacterial species, by changing the Expect Threshold and Word Size (figure 4). Interestingly, these results did not overlap with those from a search of *E. coli* specifically, nor was *E. coli* in these search results. This indicates that short, random search strings have a high probability of aligning with known DNA sequences.

BLAST results for the remaining clones compared to *E. coli* are summarized in table 2. BLAST comparisons for the seven assay clones compared to a curated list of representative genomes are given in table 3.

Among the multiple random test sequences I generated that had not been filtered for activity in *E. coli*, no significant matches with the *E. coli* genome were found. But, as in the other tests, short sections of 20–30 nucleotides had significant matches to a range of other organisms (figure 5 and table 4).

```
Escherichia coli strain 5CRE51 (Sequence ID: CP021175.1)
QUERY 80 GATGTTTCGGCCAATGCTTCCGGGCTTA 106
      ||||| ||||| ||||| ||||| |||||
SUBJECT 50834 GATGTACGGCCAACGCTCCGGGCTTA 50860
```

Figure 3. Details of the 27-bp region highlighted in figure 1, showing 89% identity at the nucleotide level. 'Query' is the test sequence (clone #2). The match was generated for nucleotides 80–106 (out of 150) in the test sequence against the 'Subject' *E. coli* genome (strain 5CRE51).

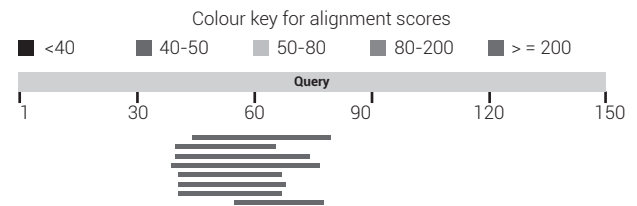


Figure 4. Graphical results for a BLAST search comparing clone 2 against a curated set of representative genomes. In order to increase specificity and reduce the number of hits, the Expect Threshold was set at 10 and the Word Size at 15. Eight diverse bacterial genomes are represented here, including representatives from genera *Streptomyces*, *Lysobacter*, *Blastococcus*, *Dietzia*, *Geodermatophilus*, and *Cupriavidus*.

Discussion

Though the sequences Neme *et al.* tested were randomized, intelligently designed sequences were placed on both sides of each random sequence to facilitate its integration into the bacterial genome. Our concept of what a gene is has changed dramatically over the past few decades. The 'one gene, one enzyme' mantra is a thing of the past. The modern definition of a gene includes alternative splicing variants of the protein for which the gene codes,¹⁶ as well as the regulatory regions, which may include enhancer regions far away from the gene itself. Evolutionists generally try to downplay the idea of functional information in biology. This does not mean that biblical creationists have not mishandled the subject over time,¹⁷ but the information content in living things is a subject evolutionists invariably avoid. Neme *et al.* did exactly that, and this led to fatal mistakes in their analysis.

Most of the clones examined received highly significant matches to the *E. coli* genome using BLASTn. However, the matching sections were all small (18–43 nucleotides). Percent identity ranged up to 100% over those small sections, meaning that the authors unknowingly identified real portions of real genes. The diversity of organisms represented in these matches was surprising. A few microorganisms, at best, other than *E. coli* were expected on the list, yet species that received significant hits ranged from beaver to bacilli (table 1). The fact that 20–40 nucleotide sections of different genomes were highlighted indicates their experimental setup was sufficient to explore a considerable portion of gene space in that size range.

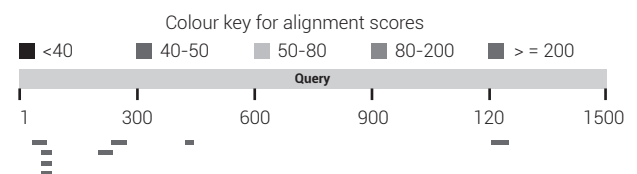


Figure 5. BLAST results generated by comparing a long string of random nucleotides to the entire nucleotide collection at NCBI. The lengths and percent matches of the flagged sections are similar to the others discovered above.

Table 2. BLAST results for multiple clones compared to *E. coli*. Included here are the first 10 'up' and the first 10 'down' strains, and each strain assayed by Neme *et al.* in competition experiments. The matching gene name is dependent on the annotation data provided by the contributor of the sequence, thus not all annotations are of the same quality. 'Direction' indicates whether the clone runs in the same direction as the gene in question. Due to the potential for frame-shifting, only 1/3 of the clones that match in the forward direction are expected to produce a protein that matches the relevant section of the gene in question.

Clone	+/-	Match (bp)	Match (%)	Matching gene name	Direction
2	+	27	89	sensor histidine kinase	Reverse
3	+	35	83	HK97 family phage portal protein	Reverse
4	+	18	100	plasmid stability factor protein StbB	Reverse
5	+	38	80	peptide permease	Reverse
6	+	36	83	plasmid transposase	Reverse
		21	95	'conserved hypothetical protein'	Forward
7	+	28	86	glycine/betaine ABC transporter	Reverse
8	+	21	95	control region, just upstream of an iron ABC transporter gene	Forward
9	+	23	91	translation initiation factor Sui1	Reverse
				glucuronide uptake porin UidC translation initiation factor	Reverse
				ligand-gated channel protein translation initiation factor	Reverse
				stress response translation initiation inhibitor YciH	Forward
10	+	22	95	vitamin B12 import system permease BtuC	Forward
11	+	18	100	scaffolding protein	Forward
12	+	27	0.89	gene 'AHM28362' (strain ST540, position 476,362)	Reverse
				gene 'AHM35289' (strain ST540, position 3,049,395)	Reverse
				gene 'AHM39887' (strain ST540, position 3,149,293)	Reverse
13	+	22	95	dyhydroneopterin aldolase	Reverse
14	+	–	–	(no significant similarity found)	n.a.
32	+	26	88	L-galactonate transporter	Forward
		21	95	Nickel-responsive regulator	Forward
		23	91	a tail tape-measure protein	Reverse
600	+	43	79	integrase (aka trigger factor)	Forward
30	–	–	–	(no significant similarity found)	n.a.
35	–	21	95	plasmid DNA, 200 bp above a known gene	n.a.
50	–	–	–	(no significant similarity found)	n.a.
51	–	24	92	putative prophage protein	Forward
53	–	–	–	(no significant similarity found)	n.a.
57	–	29	86	glutamate-tRNA ligase	Forward
59	–	–	–	(no significant similarity found)	n.a.
60	–	27	89	<i>E. coli</i> pathogenicity island 1	n.a.
61	–	24	92	plasmid DNA, 150 bp downstream and 200 bp upstream of unnamed genes	n.a.
		25	92	unnamed gene	Forward
65	–	–	–	(no significant similarity found)	n.a.
70	–	18	100	hypothetical protein	Reverse
119	–	18	100	tyrosine protein kinase	Forward

The statistics pertaining to this situation seem perplexing at first. On the one hand, a 15-nucleotide sequence would be expected to be found once in a billion random nucleotides, and a 30-nucleotide sequence once in every 10^{18} random nucleotides. These numbers are much larger than the *E. coli*

genome (of approximately 4.6 million bases). But there are several mitigating factors that greatly increase the probability of a significant hit.

First, the matching sequences do not have to be exact. There are many permutations of a 15-bp nucleotide string with one or more allowed ambiguous bases in random positions along that string.

Second, one major mistake the authors made was to assume that DNA is random. It is not. Certain combinations of letters are favoured, and others disfavoured, at all levels of organization. Unlike the DNA of higher organisms, the four nucleotides in *E. coli* are found at approximately the same frequency (24.6–25.4%). However, this is not true of the 16 dimers (4.6–8.3%), and the spread increases with increasing word size (figure 6). In fact, departures from random expectations can be found among any set of n-mers, even after accounting for the frequencies of the smaller n-mers. Thus, even though there is an astronomical number of nucleotides 150-bp in length, due to the non-random nature of biological DNA a certain subset of those combinations are highly likely to match significant portions of DNA.

Failure to take into account the non-randomness of biological DNA at all levels led a team of computer scientists at IBM to mistakenly identify millions of ‘pyknons’ in the human genome.¹⁸ These seemed like a ‘code within a genetic code’, and would have been an exciting discovery.¹⁹ However, they merely found repeating subunits of the already-known and well-characterized Alu elements that happened to permeate the genome.

Neme *et al.* made additional errors when saying things like, “Contrary to expectations, we find that random sequences with bioactivity are not rare.” This is patently untrue. They discovered approximately 700 active sequences. Out of the millions of sequences they started with, this represents a very small percentage

Table 3. Significant BLAST hits from a curated list of representative genomes for the seven assay clones

Clone	# Hits	Identity range	Species
3 (+)	3	83–93%	<i>Castor canadensis</i> [beaver] <i>Nocardiopsis ganjiahuensis</i> [soil bacterium] <i>Mesorhizobium</i> sp. [Gram-negative soil bacterium]
4 (+)	4	80–88%	<i>Callithrix jacchus</i> [common marmoset] <i>Parus major</i> [great tit] <i>Pseudopodoces humilis</i> [ground tit] <i>Rubrobacter xylanophilus</i> [Gram-positive bacterium]
8 (+)	2	86–96%	<i>Ixodes scapularis</i> [deer tick] <i>Fusarium graminearum</i> [wheat head blight fungus]
32 (+)	2	91%	<i>Cladophialophora immunda</i> [black yeast] <i>Leisingera aquaemixtae</i> [Gram-negative bacterium]
53 (–)	5	83–100%	<i>Microbacterium</i> sp. [Gram-positive bacillus] <i>Hipposideros armiger</i> [great roundleaf bat] <i>Branchiostoma floridae</i> [lancelet] <i>Pogona vitticeps</i> [central bearded dragon] <i>Castor canadensis</i> [beaver]
119 (–)	3	82–90%	<i>Corynebacterium xerosis</i> [Gram-positive bacterium] <i>Pseudonocardia dioxanivorans</i> [bacterium] <i>Pelagibaca bermudensis</i> [marine roseobacterium]
600 (+)	2	91–94%	<i>Actibacterium mucosum</i> [marine alphaproteobacterium] <i>Cladophialophora immunda</i> [black yeast]

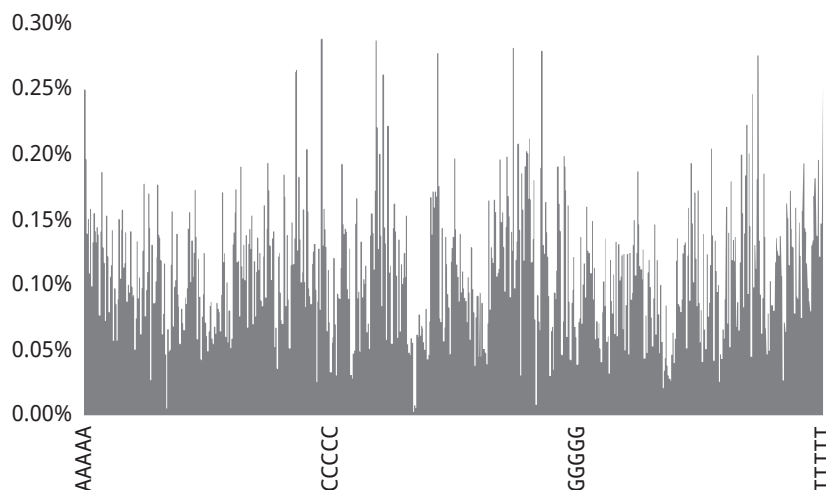


Figure 6. The frequencies of the 1,024 pentamers in the *E. coli* genome (strain REL606) are far from random. They range from 0.0025% to 0.29%. With a genome size of 4,629,812 nucleotides, there is more than enough data to generate a robust average of each frequency, so the data presented are not sampling artifacts. The range of frequencies only increases with increased word size.

of all sequences assayed (literally ‘one in a million’). While we have no idea how many of these random sequences were severely detrimental to the cell because these would quickly disappear from the culture, one would expect that most random sequences would have no effect at all.

They make an additional error by assuming that the random sequences add biological novelty to the cell. There is, in fact, no evidence for this. The majority of sequences I analyzed had a highly significant match to a known gene or what might be assumed to be a control region of a known gene. If this were not the case, one might be able to argue that short, random *proteins* can create biological novelty. Instead, it appears that short, random *nucleotides* interfere with cellular operations.

The high proportion of sequences that match the reverse complement of a known gene demonstrate that orientation is unimportant. But functional areas can include non-genic areas like promotor regions. Thus, the protein sequence, at least in most cases, though perhaps all, is also unimportant.

If these ‘bioactive’ DNA sequences are not producing functional proteins, they must be acting on the level of RNA–RNA or RNA–DNA interactions. The annealing temperatures of ribonucleic acids depend on their length and percent identity. Biological function in this case does not depend on sequence specificity. Also, the triple-hydrogen bonding G and C bind more tightly than the double-hydrogen bonding A and T, meaning sequences rich in G and C have a higher melting temperature (the temperature at which the two nucleic acids will separate in solution). The placement of G and C along the strand also impacts annealing, with terminal Gs and Cs serving to anchor the strand more so than internal ones. The skewed frequencies of A (low) and G (high) seen in the data are quite interesting in this context.

Why do we not see longer or shorter ‘bioactive’ sequences? First, due to the sheer number of permutations along a DNA strand, as the search string gets longer, the expected number of matches drops off exponentially. Second, it may be that the BLAST algorithm is cutting off less-than-perfect, but still functional, leading or trailing sequences that are beneath the detection threshold. Third,

shorter sequences will not have a high enough annealing temperature to interact directly with the genome.

What we see are the sequences at just the right length. Their RNA transcripts are long enough (20–40 nucleotides) that they could bind tightly to both RNA and DNA under physiological conditions (e.g. 37°C). The two RNA ends that have no match to the surrounding sequence would not anneal, however. This will affect the annealing of the ‘random’ RNA strand, but to an unknown extent. The RNAs produced in their experiment were on the order of 700 nucleotides, only 150 of which were the ‘random’ component. Since these

Table 4. BLAST results generated from random sequences. Tests 1–5 used 150-nucleotide test sequences. Test 6 used a 1,500-nucleotide test sequence. Genomic contexts (if available) are provided for test 6.

Test	# Hits	Identity Statistics	Species
1	3	38 bp 84%	<i>Vibrio bivalvicida</i> [pathogenic bacterium] <i>Vibrio tubiashii</i> [pathogenic bacterium] (match identical to above) <i>Aggregatibacter aphrophilus</i> [proteobacterium] (non-overlapping with above)
2	3	28–46 bp 80–93%	<i>Babesia equi</i> [protozoan] <i>Baudoinia panamericana</i> [fungus] <i>Panthera pardus</i> [leopard] (all overlapping)
3	3	23–43 bp 81–100%	<i>Numida meleagris</i> [helmeted guineafowl] <i>Schistosoma mansoni</i> [parasitic flatworm] (overlapping) <i>Helicoverpa armigera</i> [cotton bollworm] (non-overlapping)
4	5	23–49 bp 81–100%	<i>Branchiostoma floridae</i> [lancelet] <i>Asparagus officinalis</i> [asparagus] <i>Algoriphagus marincola</i> [marine sediment bacterium] <i>Paraphaeosphaeria sporulosa</i> [fungus] <i>Oncorhynchus kisutch</i> [coho salmon]
5	2	32–36 bp 89–91%	<i>Plasmodium berghei</i> [protozoan] <i>Labrus bergylta</i> [Ballan wrasse]
6	8	24–47 bp 83–100%	<i>Pseudomonas fluorescens</i> [Gram-negative bacterium] plasmid pQBR55, gene CEK42535, reverse <i>Yersinia ruckeri</i> [Gram-negative bacterium] gene ARZ027031, reverse <i>Apteryx australis mantelli</i> [North Island (NZ) brown kiwi] <i>No gene annotations provided</i> <i>Angiostrongylus costaricensis</i> [parasitic nematode] <i>No gene annotations provided</i> <i>Mus musculus</i> [house mouse] (3 identical matches) immunoglobulin heavy chain complex (Igh), Reverse <i>Mus musculus</i> [house mouse] a few hundred bp above and below two copies of MER1, a gene involved in chromosome pairing in yeast

are long compared to the oligomers flagged by BLAST, it is quite possible that they might not anneal to the bacterial DNA directly. Instead, they may operate through RNA interference, soaking up regulatory RNAs that would otherwise anneal to those 20–30 bp sections of the bacterial genome. It is also possible that they could interfere with translation by annealing to the mRNA in those short target areas.

Our understanding of the role of RNA in the cell has exploded over the previous decade. Specifically, microRNAs are short, non-coding RNAs, approximately 22-bp in size, that play multiple roles in genomic regulation.²⁰ They bind to transcribed mRNA, rendering them inactive and preventing protein translation. But short RNAs can also bind to DNA. The evidence presented in this paper suggests that Neme *et al.* stumbled upon a set of short RNA sequences that interfere with normal cellular gene regulation patterns.

Conclusion

By introducing random RNAs into the cell, Neme *et al.* inadvertently changed the genomic regulation patterns of *already existing genes*. No new functions were added. No evolution has taken place. While the experiment was ingenious, the conclusions they derived from it were unwarranted. Venema was premature in his praise.

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The human face: unique in the entire animal kingdom

Jerry Bergman

The human face design is reviewed, focusing on its complex anatomy and physiology that allows effective communication of a wide variety of emotions. The human face traits are then contrasted with those of the higher primates to document the fact that numerous major differences exist between the two. This accounts for the effectiveness of human facial communication in contrast to the very limited ability of chimps to express emotion by their faces. Last, a review of Darwin's theory of the evolution of the human ability to convey numerous emotions by their facial neuromuscular system was reviewed. It is noted that many scholars in this area have rejected Darwin's theory and have proposed alternative evolutionary theories. It was concluded that evolution does not explain the origin of the system, only design does, often the theory of overdesign.

A major way that humans communicate—for example, by smiles, looks of sadness or joy—is the face. This is possible due to facial neuromuscular components that are far more complex than in any other animal, even our putative closest relatives, the higher apes. In contrast to other mammals, including all primates, the human face is able to effectively convey an enormous range of feelings and emotions. For this reason, the human face is often referred to as the window to the soul. It has been called the epitome of beauty, as illustrated by Christopher Marlowe's reference, in *Doctor Faustus*, to Helen of Troy as “the face that launched a thousand ships”.

Human facial expressions are controlled by 55 muscles, including eye movements, which are controlled by six muscles, and the eyelids, controlled by a pair of muscles (figure 1). Facial muscles exist in every part of the face, including the jaw, scalp, cheek, eyelids, tongue, forehead, lips, nose, and around the mouth and eyes. Some muscles even control our ear auricle movement. About half of all facial muscles are required for various practical tasks, including eating, speaking, and closing the eyes. However, the other 20 or so are designed exclusively to produce facial expressions, a number which no other animal is even close to boasting.¹ A sharp contrast even exists in the neuromuscular control of human cheek muscles and those of chimps, which evolutionists claim are our closest cousins.

In addition, the neck muscles and those that control speech, including the tongue and the larynx, are also critical in conveying human feelings, both for complementing and reinforcing facial expressions. Thus, a design argument exists behind the genetic variation that produces the large number of human facial expressions, which reflect emotions. Lastly, the bone and cartilage structure, plus the soft tissue, fat, and skin, and even the eyebrows, all help make complex human

facial expressions possible. Furthermore, among all animals, humans alone have a chin at the bottom fourth of the face.²

In contrast to humans, apes have a single enormous cheek muscle pair that controls their powerful jaws, which are designed for chewing.³ The human cheek muscles, although much smaller in size, are greater in number and are designed to produce a large number of effective facial communications.⁴ For example, ape cheek muscles are incapable of producing a human-like smile. Some ape–human similarities exist, of course, but numerous major contrasts also exist.⁵

The fact that humans are bipedal facilitates facial communication. The normal mode of human locomotion is upright, allowing them to effectively communicate facial expressions face to face.⁶ Quadrupedal locomotion makes it far more difficult for mammals to communicate by facial gestures because their normal walking and standing postures involve looking at the ground.

Universal facial expressions

As noted, “facial expressions come from numerous, well-designed muscles that are unique to the human face”.⁷ It is estimated that humans can make and discern 10,000 different facial expressions, and many of these are universally found in all cultures, indicating that they are a built-in, designed means of communication.⁸ The variety of facial expressions is illustrated by psychologist John Liggett, who was able to form hundreds of artificial facial expressions based on the numerous structures unique to the human face.⁹

In contrast, apes can convey, at most, less than a dozen facial expressions.¹⁰ Because most human facial expressions are not required for survival, Burgess concluded that this ability in humans is evidence of overdesign. He writes that

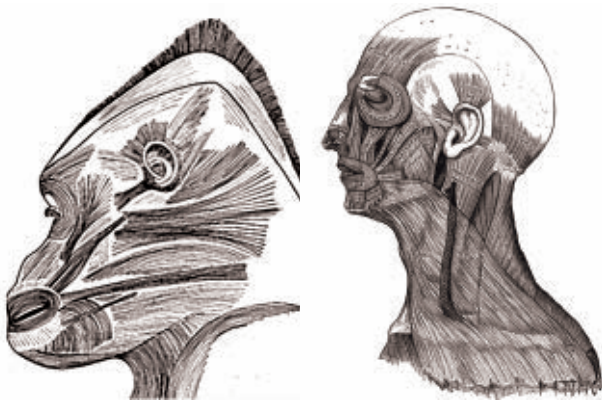


Figure 1. Human and ape facial muscles

the facial expression ability is critical for effective human communication and quality relationships, noting that humans “constantly observe and react to the facial expressions of others around them”, even though they often merely respond intuitively, with little thought. For example, when “a person sees someone looking worried, they often ask what is wrong, and when they see someone smiling, they often smile in response”.¹¹

The lip muscles are also important in achieving effective communication. Examples include pursing one’s lips, licking them, or pressing them together, which generally indicates anger or frustration. The mouth can also convey a wide variety of information ranging from fear to concern, anger, affection, and determination.¹² A big smile that flashes one’s teeth conveys friendship and acceptance. This trait is unique to humans and its origin remains a puzzle to evolutionists,¹³ especially in view of the fact that in “almost all other species, especially primates, baring one’s teeth is a threat or a show of potential force”; the opposite of its role in humans.¹⁴

The nasolabial folds, commonly known as smile lines, are facial features that are important in producing many human facial expressions. They consist of two skin folds that run from each side of the nose to the mouth corners. They are defined by facial structures that support the buccal fat pad which separate the cheeks from the upper lip. The term ‘nasolabial’ derives from the Latin *nasus* for ‘nose’ and *labium* for ‘lip’.

Even when a person is trying not to reveal their feelings via facial expressions, micro-expressions occur; a trait not existing in any primate. Micro-expressions are very brief, involuntary facial expressions that help to reveal one’s inner emotions. Actually, the face is often the best indicator of a person’s emotions. Unlike canned facial expressions, such as the so-called fake smile that we produce as actors or to mislead someone, it is very difficult to fake micro-expressions.¹⁵

Speech production

Speech production “is one of the most complex and rapid motor behaviors and involves a precise coordination of over 100 laryngeal, orofacial and respiratory muscles”. In spite of decades of research, the human speech system is so complex that we still “lack a complete understanding of laryngeal motor cortical control during the production of speech and other voluntary laryngeal behaviors”.¹⁶ An important adjunct to effect speech communication are facial cues, which often occur as soon as $\frac{1}{15}$ to $\frac{1}{25}$ of a second after words are spoken.

Charles Darwin recognized that facial “expressions give vividness and energy to our spoken word. They reveal the thoughts and intentions to others more truly than do words, which may be falsified.”¹⁹ Darwin wrote in his 1872 book *The Expression of the Emotions in Man and Animals* that many facial expressions are universal, not learned, but biologically determined, and he attempted to argue that these were the result of evolution.¹⁷ A problem with his theory is Darwin “formulated his mechanisms of expression *before* collecting data on expressions” and tended to see what he was looking for to support his theory.¹⁸ A major problem is that Darwin’s work “was not a dispassionate evolutionary work, but a tactical blow against creationist accounts of facial expression”.¹⁹ Many contemporary evolutionists have rejected Darwin’s conclusion, which relied on Lamarckian inheritance of acquired characteristics and the vestiges theory.

Modern theory instead emphasizes natural selection, adaptation and function in the evolution of facial expression.²⁰ As one of the leading evolutionary researchers opines, the origin of facial displays is purely due to specific selection pressures. They co-evolve with others’ responses to them, a theory he calls the Behavioral Ecology view.²¹ Other theories of the evolution of facial expression also exist, all which are problematic because they depend on the existence of the complex neuromuscular system that allows the enormous combination of facial variations to exist.

In a summary of Darwin’s work, Landau wrote that “the expressions of the face are in large measure universal and innate”.²² Landau and others have researched facial expressions across the world, concluding that “all members of the human species share the same expressions for signaling the basic human emotions”.²³ This finding unites all humans and contrasts us with all of the primates.

Facial expression universals

Pioneering research on facial expression universals was carried out by psychologist Paul Ekman in the 1960s. His team presented photos of faces showing different emotional states to test subjects. The test subjects then, by using a list of possible emotions, classified the emotional states that

they perceived in each photo. Ekman and other researchers have determined that the face can convey seven basic core emotions, which are now known to be universal.²⁴ They are:

1. *Joy* or happiness shown by raising the mouth corners to produce a smile, and a tightening of the eyelids.
2. *Surprise* symbolized by raising the eyebrows, opening eyes wide to expose the eye whites and dropping the jaw slightly.
3. *Sadness* symbolized by lowering the mouth corners, descending the eyebrows to the inner corners, and drooping the eyelids.
4. *Anger* shown by lowering the eyebrows, pressing the lips firmly together and the eyes slightly bulging.
5. *Disgust* symbolized by raising the upper lip, and wrinkling the nose bridge and cheeks.
6. *Fear* shown by raising the upper eyelids, opening the eyes wide and stretching the lips horizontally.
7. *Contempt* symbolized by tightening up half of the upper lip using the risorius muscle, and often tilting the head slightly back.²⁵

These facial expressions have been called the “universal language of emotion”. Blends of these basic seven exist, even of contradictory emotions, such as happiness and surprise.²⁶ These blends are shaped by our culture, contributing to the cultural diversity existing in humans today.²⁷

The whites of the eyes

The whites (sclera) of human eyes are clearly seen when the eyes are open. In contrast, in all apes, the white sclera is not normally visible. The eye sclera can be used by humans to emphasize certain emotions, such as surprise, which is expressed when the eyelids are opened wide to reveal the large white areas. In contrast, when the eyelids are slightly closed, such as during concentration or disdain, they cover much of the sclera. The sclera also makes it possible to see the eye pupil, which makes it easy to determine when the eyeball is moved downward, upward, or rolled. An example is the so-called rolling of the eyes as an expression of annoyance or disrespect.

The visible sclera also allows one to notice the direction of a person’s gaze and therefore easily determine if someone is looking directly at you, even when they are 20 or more feet away from you. In contrast, it

can be difficult to determine for sure if an animal is looking directly at you, even when it is as close as ten feet away. This is why making and maintaining eye contact is critical when communicating with someone. The whites of the eyes are a particular challenge to evolution because they are unique to humans. Even the primates that evolutionists believe are closest to our evolutionary ancestors lack this trait.

The homunculus

A good illustration of the enormous brain power required to display facial emotions is a drawing called the cortex homunculus (figure 2).²⁸ The homunculus is an illustration used to show the relative fraction of the cortex used for various body functions. The cortical homunculus is a neurological map of the anatomical divisions of the body. The two types of cortical homunculi are the sensory and motor. It was found that the face uses the largest part of the entire cortex, and the hand is the second largest part shown in the cortex homunculus.

The same pattern is more valid of the somatosensory cortex, of which the face takes up almost half of this diagram. This illustration, found in many anatomy and psychology books, is based on the research work of Canadian neurosurgeon Wilder Penfield and was first published in 1937.²⁹

The face for identification

The human face is also a major way humans identify not only individuals but ethnic groups, sexes, races and other people groups.³⁰ One of the main ways we identify the age of persons, from infant, child, adolescent, young adult, middle age, and old age is also the face.³¹ It is also

the major way that we recognize other people ranging from our family to friends. Many animals use body size and smell as a far more important means of recognizing others, as anyone who owns a dog is very aware.

Unfortunately, the face has also played a major role in the long attempt to rank the human races from highest to lowest based on the idea that facial expressions slowly change the facial structure.³² Gerasimov even claims that he can judge the personality of long-dead men by their facial traits.³³ An example is that, after years, a scowl and

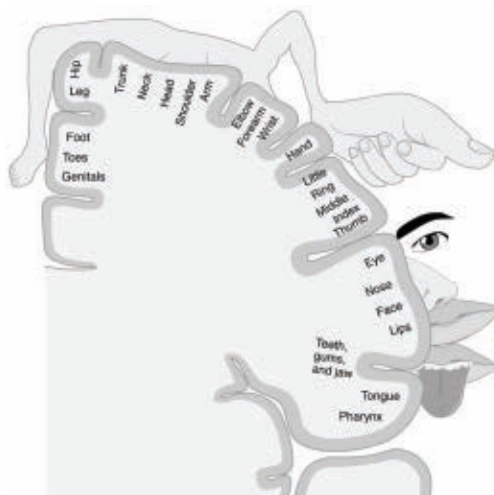


Figure 2. A cortical sensory homunculus

smoking due to pursing the lips to draw in smoke alters how the face looks.

Summary

As Landau wrote, the “human face is one of the most fascinating of all images: powerful, purposeful, personal”.³⁴ Human facial expression requires integration of both the skeleto-muscular and integumentary systems to effectively function.

The face is a highly effective and important means of human communication involving the integrated function of numerous organ systems and distinguishing humans from all other life forms including our putative closest relatives, the chimps.

The orthodox Darwinian view is that chimps and humans have a common ancestor, but scientists have not been able to explain the many profound differences between them, including the structure and function of the face.³⁵ The fact is, the human face does not closely “resemble those of apes or any other animal”.³⁶ Furthermore, the evolution of facial expression, as with all social behaviour, is “fraught with just-soism”.³⁷

Acknowledgements

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Neutral Model, genetic drift and the Third Way—a synopsis of the self-inflicted demise of the evolutionary paradigm

Jeffrey P. Tomkins and Jerry Bergman

Because of grievous deficiencies in the standard neo-Darwinian Model of evolution, which is largely selection driven, scientists proposed an alternative postulate called the 'Neutral Model' in the late 1960s. The Neutral Model is also mutation driven, but selection is deemed to be an insignificant force of change. Instead, random genetic drift is alleged to be the main driver. Since its inception, the Neutral Model has come to be incorporated in many theoretical evolutionary scenarios at some level. However, due to numerous discoveries in genomics and genome function, the Neutral Model has also become deficient, prompting a new move in science called the 'Extended Evolutionary Synthesis' or 'The Third Way', which takes a position of blissful ignorance and offers nothing tangible to extend or support evolutionary theory. While Third Way proponents recognize the deficiency of all popular evolutionary models, they maintain that more research is needed to elucidate unknown evolutionary mechanisms and processes despite the fact that the progress of scientific discovery is revealing nothing but unimaginable complexity.

Neutral Model evolutionary theory is considered by its supporters to be the primary mechanism underlying macroevolution and, for all practical purposes, has been integrated at some level into most modern evolutionary models. The Neutral Model is also a key component in the human evolution paradigm and plays a direct role in questions concerning 'junk DNA' in the genome.

As opposed to the standard neo-Darwinian Model (also known as the modern synthesis which is largely selection driven, the Neutral Model proposes that, at the molecular level, mutation-driven evolutionary changes are not primarily acted upon by selection, but are subject to random genetic drift.¹⁻³ Neutral Model theorists do not completely discount selection as a factor in evolution, but limit its theoretical impact to varying levels, depending on the proponent(s) and specific scenario being postulated. The overall theory proposes that when environmental conditions change, random mutational changes that result from genetic drift may have produced a new gene or altered the regulatory control of a network of genes that turn out to be beneficial.

Motoo Kimura, one of the original pioneers of the Neutral Model, in his seminal book *The Neutral Theory of Molecular Evolution*, defines it as follows:

"The neutral theory holds that at the molecular level most evolutionary change and most of the variability within species are not caused by Darwinian selection but by random genetic drift of mutant alleles that are selectively neutral or nearly neutral. The essential part of the neutral theory is not so much that molecular mutants are selectively neutral in the strict sense as

that their fate is largely determined by random drift."⁴

Both neo-Darwinism and the Neutral Model are ultimately mutation driven for the production of molecular variation as fodder for evolutionary processes to act on. The key principle in the Neutral Model for this variation to allegedly promote evolution is that of stochastic, or chance, processes. Kimura proposed that "the great majority of evolutionary mutant substitutions at the molecular level are caused by random fixation, through sampling drift, of selectively neutral (i.e. selectively equivalent) mutants". Kimura goes on to say that this "is in sharp contrast to the traditional neo-Darwinian (i.e. the synthetic) theory of evolution, which claims that the spreading of mutants within the species in the course of evolution can occur only with the help of positive natural selection".⁵

Since its inception, Neutral Theory has earned the support of many leading evolutionary researchers. As the late Harvard Professor Steven Jay Gould wrote in 1989, Neutral Theory "has been challenging conventional Darwinism with marked success during the past twenty years".⁶ Kimura, then at the National Institute of Genetics in Japan, wrote that he proposed Neutral Theory because many molecular research findings were "quite incompatible with the expectations of neo-Darwinism".⁴

The Neutral Theory was largely devised by Kimura as a resolution to Haldane's dilemma, which seriously challenged neo-Darwinism. Kimura himself stated, "the calculation of the cost based on Haldane's formula shows that if new alleles produced by nucleotide replacement are substituted in a population at the rate of one substitution every 2 yr, then

the substitutional load becomes so large that no mammalian species could tolerate it”.⁷ His answer to this quandary was that “the very high rate of nucleotide substitution which I have calculated can only be reconciled with the limit set by the substitutional load by assuming that most mutations produced by nucleotide replacement are almost neutral in natural selection”.⁷

Other notable scientists who were devising comparable models during this era, such as Jack King and Thomas Jukes, were concerned that Kimura’s estimates for genomic substitution rates were probably exaggerated.^{8,9} In more recent history, theoretical geneticists have put forth a variety of models that incorporate different levels of neutrality and selection in regard to evolution.^{1,2,4,10}

Random genetic drift

The concept of random genetic drift plays a pivotal role in the Neutral Model. Neutral theorists argue that “there is agreement that both random drift and selection are important in evolution; there is disagreement, however, on the relative contribution of each force”.¹¹ Genetic drift can be described by changes in the frequency of a gene or other DNA sequence variant in a population that by itself does not confer to the organism a natural selection advantage (generally defined in terms of reproductive success). Such mutational variants are assumed to be neutral or near-neutral in their effect on the genome because they do not affect reproduction to any measurable degree. Another factor is that the alleles existing in the organism’s offspring are only a sample of those existing in the parents; thus, chance plays the key role in determining if a given individual has a specific allele. A population’s allele frequency results from a fraction of the copies that survive in each generation. Neutral Theory supporters postulate that because detrimental variants are rapidly purged by natural selection, they do not make significant contributions to the variation within and between species at the molecular level. Conversely, genetic drift causes most genetic variants to disappear completely. Using numerical simulation and evolutionarily favourable parameters with the Neutral Model, Rupe and Sanford showed that the vast majority of neutral mutant alleles fail to become fixed, with the problem becoming more pronounced as population size increases.¹²

The chance events that produce a zygote in a population have been compared to the random draws of marbles from a jar. Assuming there were four different alleles of a gene, they would not be selected in their exact predicted ratios of 0.25, but in ratios that may, by chance, have a few more or a few less (figure 1). Over succeeding generations, these ratios would become more and more skewed. Herron and Freeman provide the following easily understood example:

“... random discrepancy between theoretical expectations and actual results is called sampling error. Sampling error in the production of zygotes from a gene pool is genetic drift. Because it is nothing more than cumulative effect of random events, genetic drift cannot produce adaptation. But it can ... cause allele frequencies to change. Blind luck is, by itself, a mechanism of evolution.”¹³

But are genes accurately represented as marbles in a jar? The problem is that observations of declining diversity for species within real ecological systems do not support this concept. The well-known evolutionist William Provine, in his book *The ‘Random Genetic Drift’ Fallacy*, systematically describes that what scientists have called genetic drift is actually the effects of inbreeding. Provine documents that all the key experiments performed between 1940 and 1957 allegedly documenting the idea of drift pointed to nothing more than the consequences of inbreeding.

Of course, inbreeding leads to very different genetic outcomes than do hopeful evolutionary speculations about drift. In reality, the concept of a gene pool is an antiquated

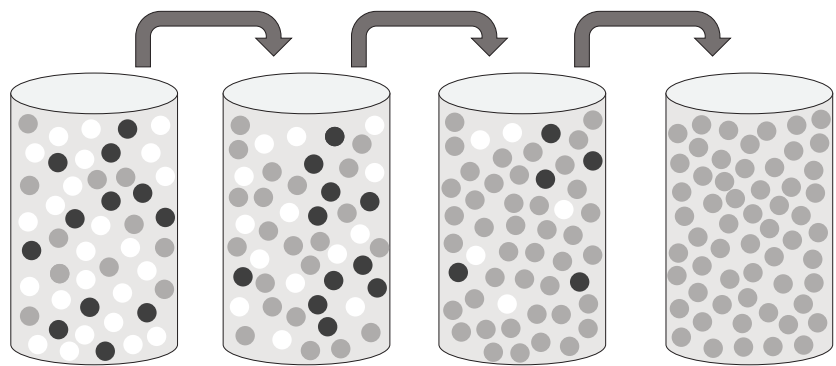


Figure 1. The hypothetical model of genetic drift can be illustrated using N number of marbles in a jar to represent N organisms in a population. Consider the jar on the far left as the starting population. The different patterns of marbles in the jar correspond to different alleles of a gene in the population. In each successive generation, the organisms (marbles) randomly reproduce. Creating the next generation can be simulated by randomly selecting a subset of marbles from the original jar and depositing it in a new jar. The second jar likely contains marble ratios different than the first jar, such that a random shift has occurred in gene allele frequencies. This process can be repeated a number of times, randomly reproducing each generation of marbles to form the next. The fluctuation of alleles is analogous to genetic drift—a change in the population’s allele frequency resulting from a random variation in the distribution of alleles from one generation to the next. It may be that, for some reason, only a certain type of organism produces offspring after this process has gone on for several generations in a small population. In this case, fixation can occur as depicted in the last jar.

model devised well before discoveries about chromosome architecture became available in the genomics revolution. Genes cannot be defined anymore as simple heritable units because not only are they large and complex, but physically linked to other genes and regulatory features in genomic neighborhoods and networks of control (figure 2). Furthermore, the cellular system of genetic recombination is a highly controlled process involving both hotspots (recombination sites) and protected areas where recombination is not allowed.^{14,15}

Noted evolutionist and Neutral Model drift proponent Michael Lynch actually takes this level of genomic complexity into consideration. For the record, Lynch candidly acknowledges the lack of explanatory power in the neo-Darwinian modern synthesis for explaining the evolution of gene networks, stating, “Although numerous investigators assume that the global features of genetic networks are moulded by natural selection, there has been no formal demonstration of the adaptive origin of any genetic network”, and, “the mechanisms by which genetic networks become established evolutionarily are far from clear”.¹⁶

So, what sort of solution does Lynch put forward to explain the evolution of complex gene networks? Amazingly, he proposes a completely speculative Neutral Model solution on a grand scale where complex interlocking gene networks ‘magically’ evolve through random genetic drift. Lynch states, “many of the qualitative features of known transcriptional networks can arise readily through the non-adaptive processes of genetic drift, mutation and recombination, raising questions about whether natural selection is necessary or even sufficient for the origin of many aspects of gene-network topologies”.¹⁶ While Lynch comes to grips with the inadequacy of the neo-Darwinian paradigm, his Neutral Model speculation, devoid of any real molecular mechanism that can create new sets of interconnected genes, is clearly even more fanciful and improbable. Networked genes actually place severe functional constraints on

gene evolution. A mutation in one gene or regulatory element will affect all other connected genomic regions.

Junk or function

A major difficulty with Neutral Theory is the assumption that most DNA is non-functional. The idea of codons (an idea which included the discovery that the third base of many amino acid-specifying codons can be variable) had been elucidated less than a decade prior to the late 1960s advent of Neutral Theory. At this time Kimura and others immediately jumped on this discovery of codon variability

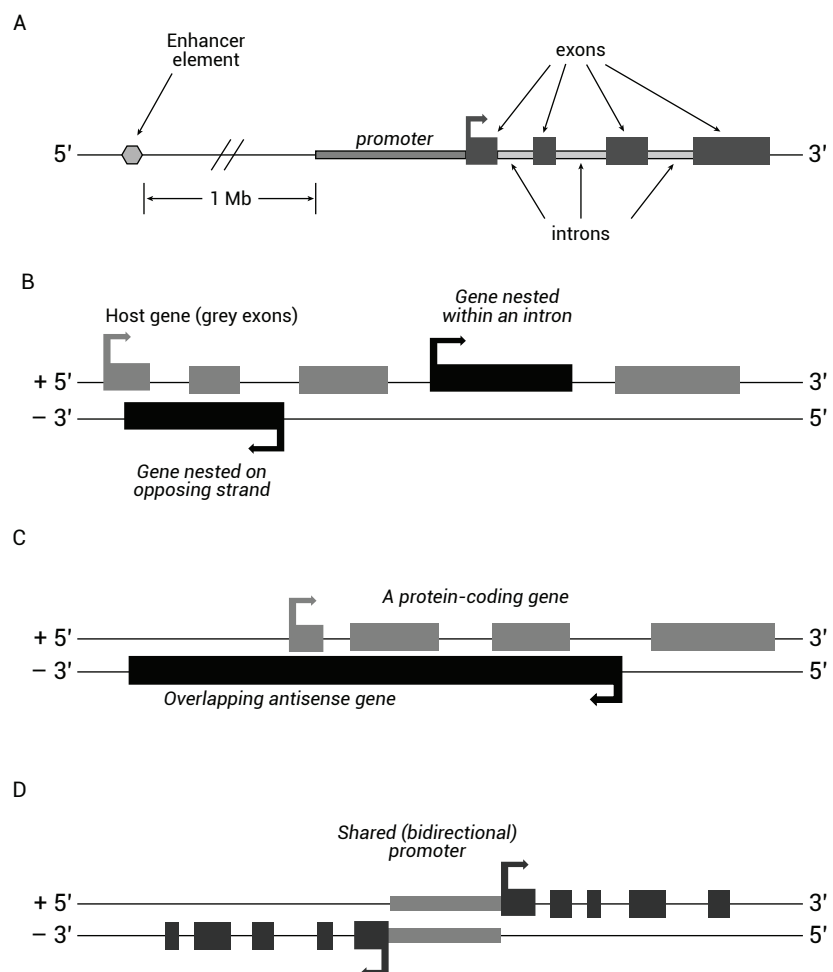


Figure 2. A depiction of why the genes as simple heritable units (marbles in a jar) is not valid in light of our understanding of genomic architecture and the interconnectivity of genes and regulatory elements over large distances. A) The basic structure of a eukaryotic gene representing the ‘genes in pieces’ concept along with a regulatory connection to a distant enhancer element that would interact with the promoter region of the gene. The arrow in the first exon represents direction of transcription. B) Depiction of two types of nested genes—one running in the same direction as the host gene within an intron and one on the opposing strand. C) Depiction of an overlapping gene—a protein-coding gene and a corresponding antisense long non-coding RNA gene on the opposing strand. D) Configuration of two neighbouring genes on separate strands sharing the same bidirectional promoter.

as evidence for neutrally evolving DNA.¹⁷ As the genomics revolution progressed, it became apparent that the coding regions (exons) of protein-coding genes only occupied less than three percent of the total genome in humans. Because much of the non-coding DNA was not well characterized, it was assumed that it was mostly non-functional and thus subject to Neutral Model evolution. We will refute each of these errant assumptions in turn, based on recent discoveries.

Codon degeneracy refuted

The variability and apparent redundancy in the third base of codons in protein-coding genes was initially termed ‘wobble’ or ‘degeneracy’. The key assumption is that different codon variants in the third base resulting in the same amino acid are functionally equivalent. Thus, it was assumed that mutations which did not change an amino acid in a codon (synonymous) would have no discernable biochemical effect in the cell.

The assumption of codon degeneracy has provided one of the key mechanisms undergirding the Neutral Model for 40+ years. In 2005, Neutral Model advocate Masatoshi Nei stated, “Because of degeneracy of the genetic code, a certain proportion of nucleotide substitutions in protein-coding genes are expected to be silent and result in no amino acid substitution.”¹⁰ Nei maintained and reiterated this belief in a follow-up publication reviewing the Neutral Model in 2010 and a book on the subject in 2013.^{1,2} However, a number of groundbreaking publications in recent years are completely uprooting this bastion of molecular evolution by providing overwhelming evidence for multi-role biochemical functionality at a codon’s third base.¹⁸

We now know that across the spectrum of life, the genomes of many types of organisms show incredible variability in their preferences for the specific usage of different codons.^{19–21} Codon preference for diverse genes has been found to not only differ markedly among diverse prokaryotic and eukaryotic taxa, but also vary widely between different genes even within the same organism’s genome.^{19,21} The authors of a recent review describing the complicated scenarios of codon usage across the spectrum of life stated that these represent “features that are difficult to explain through mutation alone”.²¹

If any seemingly synonymous codon would do, then why the incredible specificity and preference? As it turns out, there are multiple design-based reasons for specificity in codon usage.

In view of the enormous interconnectivity of cellular biochemistry, it makes sense that a specific codon code would be tied to the tRNA production system such that codon differences would control the effectiveness of the protein translation machinery. As the tRNA production levels are ‘set’ for the original code, codon changes outside this

original constraint will cause a tRNA supply imbalance.²² A more recent discovery has actually shown that tRNAs are reused in the translation process and that codon sequence, particularly at the third base, plays a key role in this cellular recycling system.²³ The tRNA recycling process is especially important for genes that are highly and rapidly expressed to maintain optimal translational efficiency.

Perhaps the greatest refutation of the idea of redundancy has been the discovery of multifunctional codes embedded in the sequences of codons.²⁴ This idea of multilayered codes within mRNAs derived from genes is not new. It has been demonstrated that protein-coding exons incorporate a variety of signals pertinent to cellular RNA processing machinery, such as splice sites, RNA editing sites, miRNA binding sites, and mRNA turnover signals in addition to the information delineating amino acids.²⁵ Now it has also been demonstrated in humans that transcription factors commonly clamp onto specific sites encoded within exons inside genes.²⁶ Incredibly, the same set of codons which specifies a sequence of amino acids also demarcates where transcription factors bind to control and regulate gene transcription.²⁷ As it turns out, this phenomenon is quite common such that about 14% of codons within 87% of human genes are proven target sites for transcription-factor binding. These dual-function codon sites in the exons of genes are now referred to as ‘duons’.

The prevalence of dual multilayered codes in codons creates a severe obstacle for the Neutral Evolution Model—an inconvenient fact that immediately became obvious to scientists after its discovery. Several researchers in a recent paper acknowledged this problem, asking, “How widespread is the phenomenon of ‘regulatory’ codes that overlap the genetic code, and how do they constrain the evolution of protein sequences?”²⁸

Not only does the presence of complex dual codes negate the evolution of proteins via alleged stochastic processes, but it has also recently been demonstrated that the third base of codons plays a key functional role during the production of proteins. As proteins are being translated, occasional pausing occurs while the protein is polymerized and funnelled through a tunnel in the ribosome.^{29,30} The sequence delineated in codons dictates the timing of polypeptide pausing as it passes through the ribosome—a process that is critical to the folding and functional three-dimensional shape of the resulting protein. Because the translation and the initial ribosomal-based folding of the protein are integrated together, the operational process is termed ‘co-translational’. This translational pausing has now been shown to be controlled specifically by the third base of the codon, adding yet one more overlapping code to the sequence of codons.³¹ Once again, the destructive effect of such a discovery on the failing paradigm of evolution was not lost on the researchers as they stated, “The functionality of codonic redundancy denies the

ill-advised label of ‘degeneracy’.” What was thought for so many years only to be meaningless redundancy and genetic sites for neutrally evolving sequence, has now been proven to be embedded with multilayered codes and critical to cellular function. Evolutionists would say that such sequences would be restrained from evolutionary processes.

Junk debunked

Early studies in reassociation kinetics at the very beginning of the molecular biology era (1970s) seemed to indicate that a large portion of the genome was repetitive in nature, with very little containing the higher complexity of protein-coding regions.³² When the first draft of the human genome became available in 2001, much of it was found to be difficult to decipher, with less than three percent coding for protein.^{33,34} This large undefined fraction was prematurely assigned the label ‘Junk DNA’, a term that had been used previously, beginning in the early 1970s, to provocatively describe DNA of unknown function as useless evolutionary baggage.³⁵ These vast non-protein-coding regions of the human genome were immediately thought to be a major source of raw genetic material that could evolve through Neutral Model processes.

As genomics technology began to advance and studies became more comprehensive and sophisticated, researchers began to realize that much more than protein-coding genes were being transcribed into RNA. In fact, nearly the entire genome was eventually found to be transcribed.^{36–40} This idea of pervasive transcription inspired some researchers to call the genome an ‘RNA Machine’.⁴¹ A significantly large component of this non-protein-coding transcriptional landscape is produced from a diverse class of genes called ‘long noncoding RNAs (lncRNA)’, which greatly outnumber protein-coding genes by at least two to one.^{36–40} The roles that lncRNA transcripts play in the cell are incredibly diverse, ranging from gene regulation, chromatin modification, translational regulation, structural and catalytic components integrated with proteins to intercellular signalling.^{24,42–46} Interestingly, many of these lncRNA genes are complexly regulated and spliced similar to protein-coding genes, but are typically expressed at much lower levels and tend to be more specific in their expression to cell state and type.

A limited number of lncRNA genes have been investigated and important function has been assigned to them.^{40,42,47–49} While many lncRNA genes have been found to be co-expressed with protein-coding genes or their expression patterns ascribed to specific cell types and states, it has been difficult to assign specific function to many lncRNAs in humans particularly. Of course, large numbers of protein coding-genes in humans still have unknown function. Much of what we know is based on research done on human cells grown in the lab, which are widely studied for the

transcription of both protein and non-coding RNA genes and are not necessarily indicative of what goes on inside real bodily tissue.

The Third Way—an extended evolutionary synthesis?

A major reason why an extended evolutionary synthesis, or as some call it ‘The Third Way’, is gaining ground among secular scientists is that (in one evolutionist’s own words) “all the central assumptions of the Modern Synthesis (often called Neo-Darwinism) have been disproved”.⁵⁰ Of course, evolutionary theory in modern times has never been without its disputes and controversies. Famed vocal evolutionist Douglas Futuyma recently stated this basic truth:

“Ever since the Evolutionary Synthesis of the 1930s and 1940s, some biologists have expressed doubt that the Synthetic Theory [the prevailing neo-Darwinian version of evolution], based principally on mutation, genetic variation, and natural selection, adequately accounts for macroevolution, or evolution above the species level.”⁵¹

In the heyday of the modern synthesis, prominent evolutionists Ernst Mayr, an authority on speciation and systematics, and George Gaylord Simpson, a leading paleontologist, both inferred from the fossil record that evolution must have occurred erratically in large jumps. This conclusion was based on the realization that transitional fossils were conspicuously lacking and that many fossilized creatures with living counterparts did not appear to have evolved at all. Many fossils, supposedly tens, or even hundreds of millions, of years old are essentially identical to living versions of the same creatures, a fact that evolutionists themselves are troubled over.^{52,53}

These glaring evolutionary problems in the fossil record ultimately provided the impetus for the theory of punctuated equilibrium proposed in 1972 by renowned evolutionists Stephen Jay Gould and Niles Eldredge.⁵⁴ To accommodate the inconvenient reality of the fossil record and its embarrassing lack of transitional forms, punctuated equilibrium postulates that macroevolution is marked by long periods of stability with no change in morphology (referred to as stasis). This is occasionally interrupted by infrequent bursts of rapid bodily alterations in which a fundamentally new form comes into being. The chief problem with this ‘hopeful monster’ idea is that the amazing discoveries in molecular biology and genomics that came on the heels of the Punctuated Equilibrium Theory essentially destroyed the molecular genetic foundations of both it and the modern synthesis. The fact of the matter is that all developmental traits are under highly sophisticated, irreducibly complex control involving hierarchical interlocking gene networks, strictly controlled

chromatin states involving non-coding RNAs, histone modifications, DNA methylation, and specific 3-dimensional chromosome conformation and architecture. And all of this nearly infinite complexity dynamically changes according to cell state and type. The number of coordinated beneficial mutations in the genome needed to produce a new ‘hopeful monster’ is completely improbable.

In the wake of new antievolutionary discoveries in molecular biology and genomics, secular scientists are at odds with each other over how macroevolution can possibly work. Approximately 10 years ago, a dissenting splinter group of prominent evolutionists broke away and formed a movement called The Third Way, or the Extended Evolutionary Synthesis.^{50,55–57} In regard to classical neo-Darwinism, the most popular and dominant form of evolution presented in textbooks and the secular mainstream, the Third Way crowd claim that this version of evolution “ignores much contemporary molecular evidence and invokes a set of unsupported assumptions about the accidental nature of hereditary variation”.⁵⁸ They also go on to state, “The DNA record does not support the assertion that small random mutations are the main source of new and useful variations. We now know that the many different processes of variation involve well regulated cell action on DNA molecules.”⁵⁸

So, what does this new daring breed of scientists propose as an alternative model of evolution, given that they also reject the overwhelming evidence that an omnipotent divine engineer is responsible for creating all this ‘well regulated cell action’? At present, they are simply taking a position of blissful ignorance and stating that they need “a deeper and more complete exploration of all aspects of the evolutionary process”.⁵⁸ In other words, no new molecular mechanism for evolution to occur is being proposed, but like Darwin in his day, these scientists are hoping that further scientific discovery will somehow uncover a solution. Of course, this hopeful attitude is despite the fact that progress in molecular biology and genomics is revealing nothing but new layers of irreducible complexity on a regular basis.

The general approach to acquiring more knowledge that would enable some sort of extended evolutionary synthesis has been summed up into four general categories of research in a recent Third Way community report (figure 3).⁵⁶ The authors of the paper state, “In this regard, insights derived from research on: (i) evolutionary developmental biology (‘evo-devo’),

(ii) developmental plasticity, (iii) inclusive inheritance, and (iv) niche construction are particularly instructive.” However, as will be discussed below, it is noteworthy that all of these proposed research areas actually present severe problems for the evolutionary model.

Developmental biology along with its organismal specificity of gene networks and extra-chromosomal cellular information, all interacting dynamically together, forms a major hurdle for random evolutionary processes to overcome, as discussed previously in this paper. Creationist researcher Alex Williams also notes that when analyzing essential developmental genes that are often similar in translated protein sequence and gene order among many taxa, no evolutionary explanation of how the toolkit repertoire came to be present at the beginning of animal life can be provided, leaving the conclusion that evolution has played no discernible role at all.⁵⁹ Furthermore, the regulatory DNA features and epigenetic mechanisms surrounding the use of developmental gene toolkits is markedly different between different types of organisms and was also present at the beginning of multicellular life.^{60,61} While the similarity of sequence in the basic protein-coding regions of some common developmental genes would on the surface seem to support, marked differences between taxa in regulatory sequence structure, differences in overall components of developmental gene regulatory networks, and the organism-specific specificity of overall epigenetic control is a complete evolutionary enigma. These taxonomic differences, combined with the fact that these systems exist at all levels of life, including the alleged beginnings of multicellular life, refute evolution. Intelligent design, however, would predict both

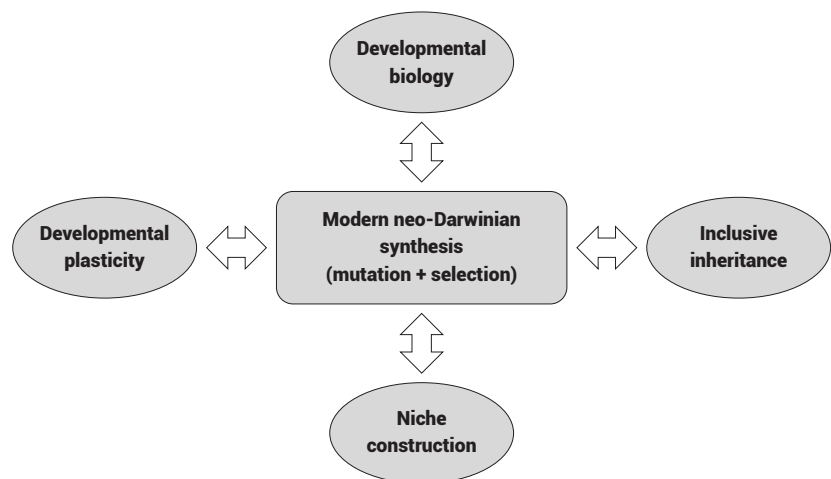


Figure 3. Depiction of the four main areas of research that Third Way proponent evolutionists are hoping will produce results that will enable them to extend the neo-Darwinian synthesis. As described in the text of this paper, these areas of research do not support an evolutionary hypothesis, but rather an intelligent design model of extreme bioengineering by an infinitely powerful and all-wise creator.

pervasive complexity and commonality based on code reuse and engineering principles.

Developmental plasticity is the ability of an organism to modify its development in response to environmental conditions.⁶² This involves a complex multilevel system of environmental sensors that constantly monitor and track a diversity of stimuli, resulting in changes in gene expression and cellular physiology. The diversity of stimuli that are tracked and monitored varies widely, depending on the organism and its environment.

One example in animals is that of field crickets, the pregnant mothers of which were exposed to the predation of wolf spiders.⁶³ These offspring show a heightened response to spider cues, thus surviving better in a spider environment than do crickets, the mothers of which were not exposed. Another more dramatic developmental example is the induction of defensive body structures in water fleas through exposure to predator chemical emissions called ‘kariomones’.⁶⁴

The mere presence of these amazingly complex features in living systems not only presents powerful evidence of adaptive systems engineering, but provides great difficulties for the selection model of standard neo-Darwinian evolution, since environmental cues would be acting on something designed to sense them and thus blunt the effects of selection. The major problems that developmental plasticity provides for evolution are not lost on its proponents. By way of example, one of these stated in a recent review paper, “Identifying the factors that promote the origin of complex, novel traits is among the most intriguing and enduring problems in evolutionary biology.”⁶²

The modern neo-Darwinian synthesis over-simplifies inheritance by reducing it to genes and variations in DNA sequences. In genome-wide association studies it became painfully obvious that most phenotypic traits with high heritability could not be linked to DNA variation in humans.⁶⁵ The concept of inclusive inheritance recognizes that biological information is not transmitted across generations by DNA sequence alone, but that both genetic and non-genetic inheritance, and the interactions between them, play interactive roles.^{56,65}

Scientists seeking to extend evolution theory recognize that, in addition to genetics, inheritance includes epigenetic, ecological, cultural, and parental factors.⁶⁵ Epigenetic inheritance involves a complex array of DNA modifications, histone modifications, and heritable RNAs that are subject to alteration by cellular machinery in response to environmental cues.⁶⁶ All of these factors affect development and behaviour, and can even have delayed expression later in life. DNA methylation patterns and histone modifications in particular have been shown to persist over multiple generations. These types of modifications affect development and cellular processes primarily through altering gene expression.

Ecological, cultural, and parental factors are other factors that are heritable. Ecological and cultural factors that persist across generations ultimately effect epigenetic mechanisms and interact with them. In respect to parental factors, genomic imprinting is especially important to mention. Environmental cues, and resulting epigenetic modifications, can cause certain genes to be preferentially expressed as being derived either materially or paternally.⁶⁷ Thus, the effect of the environment is complex and responses are based on not only genetics, but the sensor systems and regulatory pathways engineered into organisms. The diversity of factors acting both directly and indirectly on the genome is not only a confounding buffer that negates the mutation-selection paradigm of evolution, but also provides powerful evidence of engineered adaptive mechanisms pointing to a creator.

The last area of research in extending the evolutionary model is that of niche construction—the process in which an organism alters its environment, but not always in a manner that may be conducive to its long-term benefit or survival. An example would be the construction of dams by beavers across rivers and streams. Evolutionists believe that not only does an environment select for changes in an organism, but that organisms cause changes in their environment through niche construction. The obvious complication for the standard evolutionary paradigm is that this back-and-forth scenario creates a complicated feedback relationship between natural selection and niche construction, i.e. that when organisms alter their environment, change can then cause a shift in what traits are being naturally selected for. It’s a type of chicken-and-the-egg scenario, but more complicated, since organisms live in communities with other types of organisms that all have some sort of impact on their environment. Really, the environment is not driving any sort of macroevolutionary change but only providing cues that are acted on by sensory and response systems engineered into a wide variety of organisms living in community.

Conclusions

The Neutral Model was an initial effort to attempt to remedy the serious shortcomings of the Neo-Darwinian Theory of evolution. To avoid the problem of directly challenging the reigning paradigm, which would produce enormous opposition to the theory, Kimura once claimed that “neutral theory is not antagonistic to the cherished view that evolution of form and function is guided by Darwinian selection, but it brings out another facet of the evolutionary process by emphasizing the much greater role of mutation pressure and random drift at the molecular level”.⁴ Although Kimura did not openly deny neo-Darwinism, according to Gould, he views its “processes as quantitatively insignificant to the total picture—a superficial and minor ripple on the

ocean of neutral molecular change, imposed every now and again when selection casts a stone on the waters of evolution”.⁶

The Neutral Model incorporates not only codon redundancy, but vast amounts of ‘junk DNA’ as a source of mutational genetic novelty which forms an inherent assumption of the model. Negating these Neutral Theory assumptions and premises are new discoveries in full codon utility, multilayered embedded codes in and around genes, and pervasive genome transcription and functionality. In addition, extensive computational modelling of Neutral Theory has also revealed that it is defunct as a viable working evolutionary model, and would be even if the genome were heavily composed of ‘junk’.

So not only has the Neo-Darwinian Model been disproved, but the alternative Neutral Model has come up wanting as well. The evolutionary response by some has been to reject both evolutionary paradigms along with the obvious conclusion that living systems were engineered by an omnipotent Creator. Their alternative, called the ‘Extended Evolutionary Synthesis’, is really nothing but a position of blissful ignorance in hopes of discovering some yet unknown evolutionary process in a variety of research areas that are, in reality, only proving to be goldmines of opportunity for creation scientists. Scientific discovery in the area of molecular biology and genomics is steam rolling forward and only revealing a picture of nearly infinite cellular and organismal complexity.

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The central role of Darwinism in the Holocaust

Jerry Bergman

This paper challenges the common assumption that Hitler was the main driving force behind the Holocaust due to his anti-Semitic beliefs. It is well-documented that a major driving force was social Darwinism and the belief that the Aryan race was superior and had the right and obligation to prevent deterioration of the superior race by mixing with inferior races, such as Slavic peoples, Jews, Negroes and gypsies. This race view was widely supported by both the academic and medical establishments, the main groups that designed, implemented, and carried out the Holocaust.

A common assumption is that the Holocaust both originated and was carried out by Adolf Hitler (figure 1). In fact, although Hitler played a central role in orchestrating the Holocaust, both the leadership and those who directed and carried out the Holocaust were primarily doctors and academics, including especially anthropologists.¹ One reason for placing the central blame on Hitler is an attempt by those in the professions that produced the nefarious fruits of eugenics to deny the well-documented record of the past. Placing the blame on Hitler also hides, or denies, the results of eugenics by those who practised these professions.

As Shields and Dunn wrote, the political controversy over eugenics, even in America, is “a topic long neglected by historians even though our [American] eugenics program was quite advanced leading to the sterilization of some 65,000 citizens”.² They added, quoting Bruinius, that the true “history of American eugenics has been in many ways forgotten”.³ The reasons include the fact that “many progressive heroes lined up in favour of eugenics in the name of scientific progress, while Catholics opposed it because of the Church’s doctrines on the sacredness of human life”.⁴ In fact, it was not until 2013 that:

“... the full story of the Church’s often successful opposition was told by the Catholic historian Sharon Leon. In his blurb, the conservative political theorist Robert Gorge noted with exasperation, ‘If there is a story long overdue for telling, surely it is the story of how and why the Catholic Church and its faithful stood against the eugenics movement at a time when just about everyone else had gotten on the pro-eugenics bandwagon.’”⁵

Opposition also came from certain other Christian groups, mostly the conservative churches, including Baptists, Seventh-day Adventists, and Missouri Synod Lutherans.

Eugenic ‘science’ influenced Hitler

Adolf Hitler was a voracious reader and owned a large library. At least 19 of his books are known to be on the subject of Darwinism and eugenics.⁶ His Press Chief, who worked

closely with Hitler, wrote Hitler “had an amazing amount of information at his fingertips, and ... [was] enormously well-read ... he would sit up late carefully reading all new publications”.⁷ Hans Frick, Hitler’s personal lawyer, stated before his (Frick’s) 1946 execution at Nuremberg that Hitler carried a copy of Schopenhauer’s *The World as Will and Representation* with him throughout World War I. Schopenhauer developed some evolutionary ideas even before Darwin (figure 2) published his survival-of-the-fittest theory. An example is the concept that all life strives to preserve itself, and those forms that succeed better in doing so will be more likely to thrive. Our mental and other faculties are merely tools to achieving that end. Furthermore, “Along with the scientific and technological burgeoning, German philosophers ... were overturning long-held ideas about the nature of man and his society. With Charles Darwin ... and Sigmund Freud ... they would reshape the contemporary Weltanschauung so it would never be put together in the same way.”⁸ This Weltanschauung influenced Hitler greatly.

When sent to Landsberg Prison (figure 3) as a result of the 1924 failed Nazi Beer Hall Putsch in Munich, Hitler was regularly supplied with reading materials by his friends and associates. He even once described his prison stay as a university education paid for by the state.⁹ While incarcerated, Hitler read, among other books, the two-volume work, *Principles of Human Heredity and Race Hygiene*, first published in 1921. This book, which almost perfectly spells out the groundwork or fundamentals of the Holocaust, was co-written by three leading eugenicist professors: Eugen Fischer, Erwin Baur, and Fritz Lenz.¹⁰ Baur died in 1933, but the other two co-authors were active members of the Nazi party for decades.

This book was so popular in Germany that it went through five editions from 1921 to 1940, and almost all the reviews were positive. Hitler used the eugenics notions developed by Germany’s leading scientists to support the ideal of a pure Aryan society in his manifesto, *Mein Kampf* (1928).¹¹ Several of Hitler’s statements in *Mein Kampf* document his reliance on Darwinism to justify his support of various eugenics and infanticide programs, e.g.:



Figure 1. Adolf Hitler, the leader of Nazi Germany. He was greatly influenced by social Darwinism and eugenics, both worldviews widely held by academia, especially by professors of medicine, anthropology, and genetics.

“While nature only allows the few most healthy and resistant out of a large number of living organisms to survive in the struggle for life, people restrict the number of births and then try to keep alive what has been born, without consideration of its real value and its inner merit. Humaneness is therefore only the slave of weakness and thereby in truth the most cruel destroyer of human existence.”¹²

The book *Principles of Human Heredity and Race Hygiene* soon became the scientific basis for Nazi Germany’s eugenic sterilization programs and the central importance of isolating, and eventually killing, inferior races to ensure the purity of the German race. Its first author, Fischer, was Director of the Kaiser Wilhelm Institute of Anthropology, Human Heredity, and Eugenics, and Rector of the Frederick William University of Berlin.

Fischer’s ideas were central in the anti-Jewish Nuremberg Law of 1935 that was the first formal step that led to the Holocaust and served to justify the Nazi Party’s racial superiority programs. Decades before then, Germany had already run concentration camps in the German-ruled colony of South-West Africa. These pre-World War I camps, a

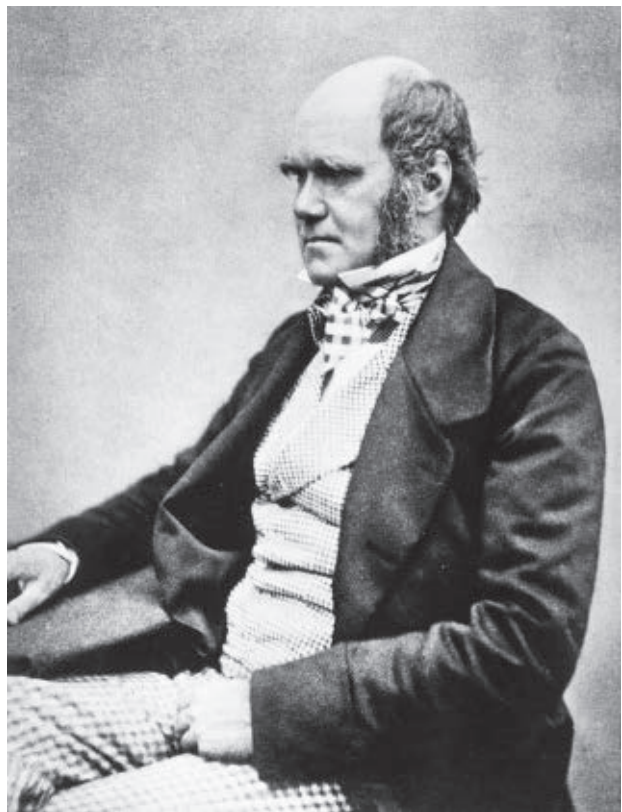


Figure 2. Charles Darwin, who did not originate the theory of evolution by natural selection, but did more than any other man to popularize it, first in England, next in Germany and then throughout the world.

forerunner of the Nazi death camps, murdered, starved, and experimented on hundreds of native Africans.¹³ Fischer was also featured as a speaker at a population conference organized by the American birth control founder Margaret Sanger.

As Professor Sacks concluded, the concern was not only that Hitler imbibed these “ideas, whether through Nietzsche, Spencer, Haeckel or other writers”, but that these eugenic ideas

“... were widely shared among intellectuals of the time. The movement for eugenics, the selective breeding of humans and the sterilization of the mentally handicapped and those otherwise declared unfit, was pioneered by Darwin’s half-cousin Sir Francis Galton and supported among others by H.G. Wells, George Bernard Shaw, John Maynard Keynes, Woodrow Wilson and Theodore Roosevelt.¹⁴

It was only after the full realization of the horror and scale of the Nazi genocide programs was revealed that these programs were finally rendered morally unacceptable. The steps to the Holocaust began with the case of Gerhard Kretschmar, an 11-month-old blind child with deformed limbs.¹⁵ Richard and Lina Kretschmar, both ardent Nazis, petitioned Hitler



Figure 3. Aerial view of Landsberg Prison where Hitler was incarcerated after the Nazi party's failed coup in 1924. It was here where Hitler dictated *Mein Kampf* to Rudolf Hess and also read several books advocating superior race theories.

to euthanize the child to open the door wide to euthanize deformed children. In the United States, the US Supreme Court case titled *Buck vs Bell*¹⁶ opened the door wide to sterilize mentally deficient persons. In the US, the result was to sterilize over 60,000 people judged mentally or physically deficient¹⁷ and in Germany about 200,000 people were euthanized, plus an additional many thousands in German-occupied countries.

The next step in Germany was to ramp-up “gene-cleansing efforts from sterilization to euthanasia—what quicker way to purify the gene pool than to exterminate” the defective races and peoples.¹⁸ In the process, the “aura of science and medical research was meticulously maintained” to justify the Nazis’ deeds in the name of ‘science’.¹⁹ Along this line, German historian Wendy Lower wrote that the

“... first Nazi mass murderess was not the concentration camp guard but the nurse. Of all the female professionals, she was the deadliest. Centrally planned mass killing operations began neither in the gas chambers at Auschwitz–Birkenau nor in the mass shooting sites of Ukraine; they began instead in the hospitals of the Reich. The first methods were the sleeping pill, the hypodermic needle, and starvation. The first victims were children. During the war, nurses gave thousands of deformed babies and disabled adolescents overdoses of barbiturates, lethal injections of morphine, and denied them food and water.”²⁰

She added that these programs were all carried out “... in the name of progress and the health of the nation. In the late nineteenth century, the modern science of genetics spawned the international field of eugenics, a term defined in the sub-title of a 1910 book

by an American leader in the field, Harvard-educated Charles Davenport—*Eugenics: The Science of Human Improvement by Better Breeding*.”²¹

In Germany, eugenics was called ‘racial hygiene’, and was specifically aimed at increasing

“... the Aryan population. Inherited ‘genetic’ defects and traits were understood as racial or group manifestations that defined humanity’s different civilizations, some deemed more advanced than others, all of them competing for survival. Racism, like nationalism, was viewed positively. Progress, imagined in German ideals of beauty and conduct, could be achieved only by removing humanity’s blights. In the hands of revolutionary zealots, Nazi men and women of action, this science of human inequality had to be taken as far as it could go.”²²

The scientists soon found that even biological

“... sterilizations were insufficient to achieve the goal of Aryan perfection through social engineering, and segregation was not enough either. The only total, ‘final’ solution to the problem of racial degeneration was to destroy the contaminant, starting with ‘defective’ Germans. Misleadingly termed ‘euthanasia’ or ‘mercy killing’, the top-secret program was personally authorized by Adolf Hitler and carried out under the cover of war.”²³

As Sacks remarked, the “Holocaust did not take place long ago and far away”. Rather, it occurred “in the heart of rationalist, post-Enlightenment, liberal Europe” and, in other words,

“... the epicenters of antisemitism were places of

cosmopolitan, avant-garde culture like Berlin and Vienna. The Nazis were aided by doctors, lawyers, scientists, judges, and academics. More than half of the participants at the Wannsee Conference in January 1942, who planned the ‘final solution to the Jewish question’, the murder of all Europe’s Jews, carried the title ‘doctor’.”²³

Holocaust survivor and Professor of Neurology and Psychiatry at the University of Vienna Medical School, Viktor E. Frankl, astutely evaluated the influence of modern anthropologists and other academics in helping to prepare the road to Nazi atrocities. He concluded:

“The gas chambers of Auschwitz were the ultimate consequence of the theory that man is nothing but the product of heredity and environment—or, as the Nazis liked to say, of ‘Blood and Soil’. I am absolutely convinced that the gas chambers of Auschwitz, Treblinka, and Maidanek were ultimately prepared not in some Ministry or other in Berlin, but rather at the desks and in the lecture halls of nihilistic scientists and philosophers.”²⁴

The fact is, eugenics

“... was allowed to flourish in Nazi Germany. The scientists involved ‘were not bizarre and perverse psychopaths ... In the postwar period, they were very well integrated in German society. They were very good researchers of international standing ... [under] which these kinds of biomedical scientists are prepared to initiate or commit atrocities to further their research interests.”²⁵

Svante Pääbo, pioneer of ancient DNA research, wrote that many of the Nazi eugenic programs supported by the Eugenic Kaiser Wilhelm Society produced world-class research. This past haunts Germany today. One guiding principle of the modern Max Planck Society was to establish research institutes

“... on topics in which Germany was scientifically weak. An area of particular weakness was anthropology, and for a very good reason ... the MPS [Max Planck Society] had a predecessor before the war. Its name was the Kaiser Wilhelm Society ... had built up and supported institutes around eminent scientists such as Otto Hahn, Albert Einstein, Max Planck, and Werner Heisenberg, scientific giants active at a time when Germany was a scientifically dominant nation.”²⁶

He added that this “era came to an abrupt end when Hitler rose to power and the Nazis ousted many of the best scientists because they were Jewish ... the Kaiser Wilhelm Society became part of the German war machine”.²⁷ Furthermore, it was “through its Institute for Anthropology, Human Heredity, and Eugenics that the Kaiser Wilhelm Society was actively involved in racial science and the crimes that grew out of that”.²⁸ It was this institute where

“... people like Josef Mengele were scientific assistants while performing experiments on inmates at Auschwitz death camp, many of them children. Whereas Mengele was sentenced for his crimes after the war (although he had escaped to South America), his superiors at the Institute for Anthropology were never charged. On the contrary, some of them became professors at universities.”²⁹

Racism and leading scientists

In addition, one of the earliest promoters of social Darwinism in Germany was University of Jena zoology Professor Ernst Haeckel.³⁰ This pioneering German evolutionist also “followed a Darwinian trope in arranging human ‘species’—12 of them, comprising 36 ‘races’ in all, in his scheme—in phylogenetic trees” which were rated from inferior to superior.³¹ In the 1860s he used Darwin’s theory for developing a philosophy that applied not only to biology, but also to psychological and social phenomena.³²

Haeckel actively promoted Darwinism, especially the idea that “the central European races were the most highly developed” and that by “virtue of their abilities, they would triumph over all other races and dominate the entire world”.³³ Haeckel in his best-selling book *Die Welträtsel (The Riddle of the Universe)*,³⁴ also advocated the killing of those persons with hereditary defects, including cripples, the deaf, cretins, and the retarded, to name a few examples.³⁵ The escalation of racism by academics and social Darwinism in Germany that led to the Holocaust

“... was almost seamless, beginning with the compulsory sterilization of unwanted types, then the killing of ‘impaired children’ in hospitals, then the killing of ‘impaired’ adults (the mentally and physically handicapped) in special centers by carbon monoxide gas, then the extension of this to the concentration and extermination camps. The programme was carried out, throughout, by doctors and psychiatrists, only a handful of whom objected.”³⁶

The program was halted in August 1941 due to the large number of protests, largely from the churches. In a review of the many rationalizations that the Nazis gave for their Darwinian eugenic programs, “what is striking is not only the specific ideas of social Darwinism—the strong eliminate the weak, the Aryan race must be protected against pollution—but the overwhelming sense of the *authority of science*, whatever the science”.³⁷

Furthermore, the United States contributed both professionally and financially to the racial research that formed the intellectual foundation of the Holocaust.³⁸ The field of anthropology’s focus on “the physical differences among people went hand-in-hand with” the academic emphasis on the hierarchical placement of human groups.

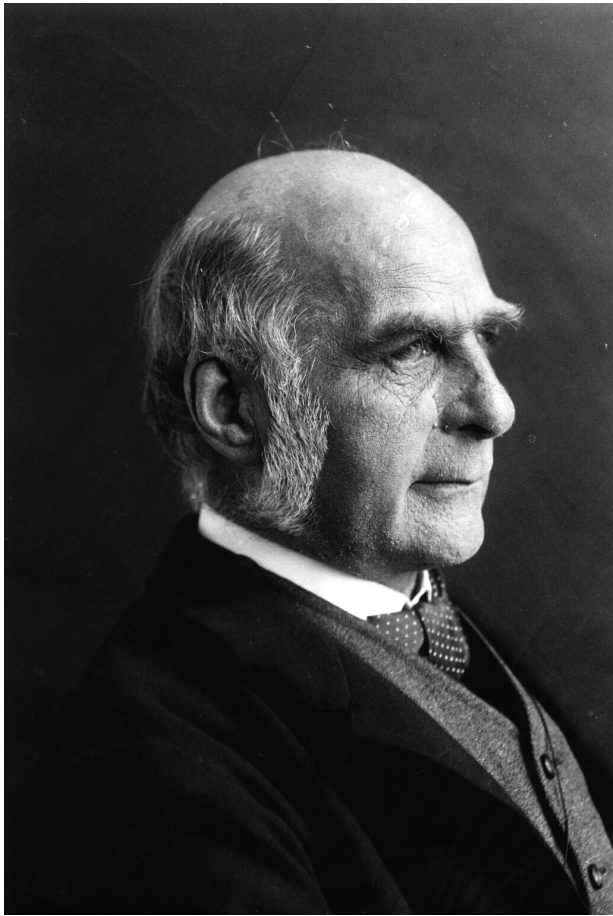


Figure 4. Francis Galton, Darwin's cousin, who coined the word eugenics. His book *Hereditary Genius* (1869) was the first attempt to study what he saw as superior individuals, and formed the basis of his eugenic theory. Galton was very influential in convincing Darwin and many others to accept eugenics partly because he appeared to put the field on a scientific basis.

The case for the 'northern races' superiority was effectively "presented by Count Joseph Arthur de Gobineau (1816–1882;), a cultural historian ... [who] published his theories in the late 1800s and warned of the dangers of race mixing".³⁹ Gobineau was not the first to argue for European racial superiority, although he was one of the more influential racial theorists. Specifically, Gobineau concluded that the German races, including the Indo-Germanic and the Aryan races, were those persons from the people groups that were more culturally and otherwise more evolved, and

"... only members of these races could rule others. To this end, he urged that these racial groups must remain pure. Gobineau's theories found great acceptance in Germany, and copies of his books sold well. ... His ideas were planted in German society and resonated among anthropologists such as Alfred Ploetz, the founder of the [German] eugenics movement."⁴⁰

Gobineau's anthropologically based racial ideas were "... fused with another distinct trend of racial

thinking, which had its roots in Charles Darwin's theory of the process of evolution through natural selection ... Gobineau's contribution to science, were it not for his lethal influence on the development of racial doctrine, would hardly have merited even a footnote in intellectual history."⁴¹

The lead role of eugenics in the Holocaust

Another central factor causing the Holocaust was not only Darwinism but also socialism, both of which influenced the so-called race hygiene movement. Ploetz (1860–1940) enthusiastically read the works of not only Charles Darwin, but also those of Ernst Haeckel and Friedrich Nietzsche.⁴² Ploetz was the author of *The Fitness of our Race*, a book that heavily influenced many Nazi leaders and intellectuals.⁴³ He also founded *The Journal of Social and Racial Biology* in 1904, which was very influential in both the Nazi movement ideology and in the development of racial anthropological theory, as well as in German academia as a whole. One of his pupils was the aforementioned Fritz Lenz (1887–1976).

Other leading figures in the eugenics movement included Ernest Rüdin, Karl Pearson, Charles Davenport, August Forel, Psychiatrist Wilhelm Schallmayer, and even Darwin's cousin, Francis Galton (figure 4). The inspiration for all of these eugenic leaders was

"Darwin's publication *On the Origin of Species* [that] brought about a great tidal wave of interest in speciation. If animals of other species had varieties within them, why not look for such variation in humans as well? Perhaps all humankind had not evolved from the same sources ... polygeneticists believed they evolved through various prehuman species, resulting in different 'kinds' of people. The debate was a precursor to the discussion of race, and interest in this controversy ran high within the burgeoning field of anthropology. Darwin had created a new vocabulary and a new way of looking at existing anthropological questions about human remains and about living human groups."⁴⁴

These eugenic leaders all consistently maintained that Darwinism was central to their eugenics ideas. Professor Ploetz opened his influential book with the following quote from Nietzsche: "upward leads our way from the species to the superspecies",⁴⁵ concluding that the "Aryan race alone stood at the peak of racial development".⁴⁶ The fact is, the

"... scientific and political movement of 'racial hygiene' is on many levels linked to the development of Nazism and Fascism with their racist medical philosophies, the segregation and sterilization laws, as well as, later, the murderous Nazi euthanasia program. Largely conceived and popularized through ... Ploetz ... the term 'racial hygiene' (*Rassenhygiene*)

... specifically sought to attribute eugenics assumptions about the inheritability of human social and biological traits to a background understanding of ‘race’ and ‘racial degeneration’, this particular form of eugenics was influential ... throughout much of northern Europe.”⁴⁷

Ploetz, a socialist, also worked tirelessly to “reconcile Socialism with Darwinism”.⁴⁸ Ploetz and his wife Pauline (née Rüdin) lived in the United States for four years, and while living there were influenced by several leading American Darwinian eugenicists.⁴⁹ They had originally wanted to move to South Africa to study “the lowest human races”,⁵⁰ a goal that did not work out. Of note is, when living in the USA, the couple “felt frustrated because they could not openly proclaim their hostility to Christianity ... and their sympathy for socialism” in America.⁵¹

Physicians and race degeneration

The Nazis “had no difficulty finding physicians willing and enthusiastic to participate in killing the disabled ... quite a few leading physicians already had jettisoned the idea that the disabled had a right to live”.⁵² Another leading scientist who supported this view was prominent eugenics advocate Max von Gruber (1853–1927), a Munich Professor of Hygiene. Hitler’s conclusions about the putative loss of

“... biological vitality and evolutionary progress of the German people was a common theme in eugenics literature in the early twentieth century. In a book written shortly before World War I, the famous professor of hygiene and avid eugenics advocate, Max von Gruber, warned about biological degeneration that would occur if German [Aryan] birthrates continued to decline.”⁵³

He also discussed “the same concern in a 1918 article in the book *Germany’s Awakening Renewal* that Hitler may well have read. Many other eugenicists, including Ploetz, agreed with Gruber” about his biological degeneration concern.⁵³ One of the most detailed studies of Nazi scientists by the lead investigator, Dr Leo Alexander, of the crimes that were committed in the name of neuropsychiatry and neuropathology concluded that the odious “core Nazi belief that had informed the practice of medicine under Hitler’s rule”⁵⁴ was that not

“... only were all people not created equal in the eyes of the Third Reich, but some people were actually not human at all. According to Nazi ideology, *Untermenschen*—subhumans, as they were called, a designation that included Jews, Gypsies, homosexuals, Poles, Slavs, Russian prisoners of war, the handicapped, the mentally ill, and others—were no different from white mice or lab rats whose bodies could thereby be experimented on for the advance of the Reich’s medical goals.”⁵⁴

According to Heinrich Himmler, “The sub-human is a biological creature, crafted by nature which has hands, legs, eyes, and a mouth, even a resemblance of a brain. Nevertheless, this terrible creature is only a partial human being Not all of those who appear human are in fact so.”⁵⁴ Jacobsen commented that, although

“... German citizens were asked to believe this pseudoscience [of eugenics]; millions did not protest. German scientists and physicians used this racial policy to justify torturous medical experiments resulting in maiming and death. In the case of the handicapped and the mentally ill, the *Untermenschen* theory was used by German doctors and technicians to justify genocide.”⁵⁵

Ernst Rüdin

Ernst Rüdin (1874–1952) was a Swiss-born geneticist, eugenicist and Nazi who rose to prominence around 1907. When at the University of Munich, he was an assistant to psychiatrist Emil Kraepelin (1856–1926). Rüdin later assumed the directorship of what is now the Max Planck Institute in Munich. Professor Rüdin’s avid support for eugenic racism was so great that his colleagues nicknamed him the “Reichsführer for Sterilization”.

Both Professors Rüdin and Kraepelin were ardent advocates of the theory that the German race was degenerating. Rüdin has long been internationally regarded as the pioneer of mental inferiority genetic inheritance studies. He also argued for, designed, justified, and even helped to finance the mass sterilization and clinical killing of putatively inferior German children and adults.

The steps in place for the Holocaust before Hitler

Ernst Rüdin, Alfred Ploetz, and several other racial hygiene ‘experts’ under Reich Interior Minister Wilhelm Frick formed the “Committee on Questions of Population and Racial Policy”. Frick was convicted in the first Nuremberg trial for crimes against peace and humanity, and war crimes, and hanged in 1946. The committee’s ideas were the scientific basis used to justify Nazi Germany’s racial policy that ended in the Holocaust. As a result of the strong support of these and other professionals, the “Law for the Prevention of Hereditarily Diseased Offspring” was promulgated in July 1933 and put into effect by the German government on 1 January 1934.

The next step was to extend the program to those persons that the anthropologists claimed were members of inferior races, including all non-Aryans, such as Jews and Slavs. The work of Ernst Haeckel was another important cornerstone of the Holocaust and, partly due to his frequent attacks on the churches and Christianity, undermined Judeo-Christian

ethics and morality which resisted the Holocaust.⁵² Haeckel also supported the form of social Darwinism which taught

“... that human society was itself like a biological organism and that therefore the principles of selection, ‘Culling Out’ and the ‘Right of the Stronger’ which occur in nature, should also govern relations between human individuals and groups. While Social Darwinism was by no means an exclusively German phenomenon, nowhere else was it raised, even before Hitler came on the scene, to the status of a world religion.”⁵⁶

Most of these racist ideas existed even before Hitler became Germany’s leader.⁵⁷ For example, Darwinism’s spread in Germany was facilitated by an essay competition that was

“... sponsored in 1900 by the head of the powerful Krupp Corporation on the topic: ‘What can we learn from the principles of Darwinism for application to inner political development and the laws of the state?’ The winner of the first prize, Wilhelm Schallmayer, looked at all human institutions in terms of the struggle for survival.”⁵⁸

Schallmayer’s close associate and supporter was none other than Alfred Ploetz. Social Darwinists taught that Germany’s humanitarian social programs favoured the weak and interfered with

“... the process of natural selection as a healthy regulator of human affairs. Social Darwinists saw it as their task to reverse this ‘unhealthy’ interference with the natural process. They demanded that the modern State stop supporting the ‘incapable elements’ and favor instead the biologically valuable elements on whom the survival of the race depends.”⁵⁹

In the name of the “principle of self-preservation of the species”, social Darwinists such as Alexander Tille demanded the “right of the stronger races to destroy the weaker. Once the Nazis seized power in Germany,” this social Darwinian foundation became the Nazi Party foundation.⁶⁰

Why Hitler hated the Jews

Why Hitler hated the Jews is a complex subject, but it is known that when Germany “annexed Austria, Hitler had both the area of his father’s birthplace, Dollersheim, and the grave of his grandmother designated as a tank-training ground”, thus forever destroying all evidence of his paternity that was located there.⁶¹ Some speculate that the reason was due to a self-hate, based on the theory that Hitler was part Jewish. Complicating the issue further is that, in his early life, Hitler had many Jewish acquaintances and friends. One example included his mother’s physician, Eduard Bloch, who treated her (sometimes *pro bono*) until she died of breast cancer on 21 December 1907, aged only 47. Hitler allowed Bloch to sell his house at market value and emigrate with his wife from Austria to the USA. Other examples include:

“Hitler received his First-Class Iron Cross in World War I from a Jew, First Lieutenant Hugo Gutmann. He borrowed his psychology of the masses from Sigmund Freud, a Jew. Eva Braun, his mistress, was saved after her second suicide attempt by a Jewish doctor, Martin Marx; his vegetarian cook, Marlene von Exner, was part Jewish. And finally, one of Hitler’s allies in the war, Francisco Franco, was half-Jewish.”⁶²

Hitler was also indebted to several Jewish art dealers, including Samuel Morgenstern, Jakob Altenberg, and Samuel Landsberger, who marketed his artwork.⁶³ The music of Jewish musician Anton Bruckner was ‘beloved’ by Hitler for its ‘Germanic grandeur’.⁶⁴

Conversely, Hitler was very influenced to hate Jews and other ‘inferior races’ by the German educational system. For example, the education of SS members taught them to distinguish

“... between inferior and ‘high-value races’ which were defined as ‘the culminating entities of the biological process’. The primary representatives of the ‘high-value races’ were the people of Nordic stock. They had survived in the struggle for existence ... because of an inborn creative ability that brought them forward in the process of natural selection. They thus provided ‘the most striking evidence of the basic law of the eternal struggle, in which all the weak and the less valuable must succumb’.”⁵⁹

Furthermore, the German education system and academia taught the main populations that those that were supposedly of “inferior racial stock, the Jews, did well living in cities, which ... were harmful to the majority of people and especially to the high-value races”.⁵⁹ In fact, the German university professors were called the midwives who helped give birth to Nazism.⁶⁵ The Nazi State, which adopted these ‘biological facts’ into their worldview on the authority of the scientific establishment, then turned its attention to developing programs for “promoting greater discrimination” in the reproduction of humans.⁵⁹

In the next step, the “German anthropologists ... collected body parts, bones, and measurements of a people they were helping to eliminate, believing that such memorabilia would have ‘a rare value’ when the [eugenic] work was done, [and] the annihilation complete”.⁶⁶

So many professors, scientists, and doctors were guilty of war crimes involving the application of social Darwinism that a second Nuremberg trial was held in December 1946 specifically for this group. Of the 23 Nazi doctors and scientists, only one woman was tried, Dr Herta Oberheuser, who had performed gruesome medical experiments on death camp inmates, some of whom she murdered.⁶⁷ She received a light sentence, only 20 years in prison—which was later reduced to five years. Of the various Nuremberg trials, over 30 prisoners received death sentences.

This history ignored

A problem that Shields and Dunn note is this history of the influence of academia on Nazism is often ignored, trivialized or, worse, denied by academia and Western society in general. To remedy this problem requires

“... an outcry against any attempt to trivialize, relativize, or hide the history of the Third Reich. Anthropology is a profession that has had every opportunity to know, understand, and value diversity in human life and its cultures, peoples, and habits; yet, in the case of the Nazi anthropologists, it turned against that opportunity. Instead, it measured the value of human beings by fictitious standards of *pseudonatural* science and *pseudosocial* science, causing the obliteration of rich cultural traditions as well as death, and destruction to unfathomable numbers of human beings [emphasis in original].”⁶⁸

This effort not only was designed to legitimize social Darwinism, but also to “draw attention away from the annihilation of Jews” to the group of prolific and tireless writers

“... who have worked over the last twenty years to expose the Nazi past ... as they, in the process, expose the continuing careers of many perpetrators. There is a suspicion that the attempts to tie the Nazi period to activities of former Nazis in the post-war period could be used to promote a left-leaning agenda by implying that nothing has changed in Germany from the Nazi era.”⁶⁹

Furthermore, because many of the Nazi scientists retained their positions after the war, probing their role during the Nazi era was difficult and “the reluctance persisted long after the first investigations”.⁷⁰ One research professor, Dr Roelcke, “encountered resistance several years ago when he attempted to document that Ernst Rüdin, the Nazi-era Director of the Institute for Psychiatry in Munich, and the University of Heidelberg in Germany were involved in research on child euthanasia victims.”⁷¹

Conclusions

The fact is, the many “scientists associated with the Kaiser-Wilhelm Society enhanced the credibility of the Nazi state’s program of scientific terror and murder”.⁷² If it were not for Darwinism, and the application of his theory called social Darwinism, the Holocaust would likely never have occurred in Germany. Darwinism is the idea that all living species, including humans, are “subject to, and are a result of, natural selection, that is the survival of the fittest and the strongest”.⁷³

In short, Darwin’s influence on anthropology, and academia as a whole, was summarized by one historian

by noting that “Anthropologists began to link pre-hominid remains with evidence of current human variation, trying to establish lines of heredity In looking at human heredity and culture in an evolutionary framework, anthropology became a strong force in secularizing society against the power of the church.”⁷⁴ Furthermore, the anthropologists

“... had collected remains of human varieties throughout the world, and ... such artifacts became a central measure of a museum’s or a university’s prestige, and efforts to systematize racial history ... [that] became a dominant theme in the anthropological literature. Ethnographic museums sprang up throughout Germany and were the envy of museum people throughout the world.”⁷⁵

In addition, the

“German university was the intellectual fatherland of eugenics and racial science. The universities of Germany and Austria and their constituent faculty played critical roles in the development and advancement of eugenics and racial selection: they enforced sterilization, euthanasia and inhuman experimentation on the living, as well as on the exploitation of the bodies of victims of state terror for the teaching of human anatomy and pathology.”⁷⁶

This event is also one of the worst world horror events ever in terms of number, extent and the level of suffering, an evil close to unparalleled in the entirety of human history.⁷⁷

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Extensive mixing among Israelites and non-Israelites in biblical history

Robert W. Carter

The genetic state of the Israelite nation is a fascinating subject with profound theological ramifications. They have possibly the most well documented ethnological history of any people group in antiquity. But when considering how separate the Israelites should have been from other people, multiple passages indicate extensive mixing between them and the surrounding nations. The question “What is a Jew?” is a complicated one that takes a significant amount of study to answer. In the end, it should be clear that ‘Jewishness’ is more of a religious and cultural concept than a genetic one. If we then generalize this model, we can derive multiple factors that should influence our concept of ‘race’ from a biblical perspective.

To understand the genetic differences between the people groups scattered across the earth, one must look at the human population between the Flood and Babel. The size of the pre-Babel population would have affected the genetic diversity within and among the post-Babel clans. We cannot know how many people were alive when God separated them, for the population size at Babel depends on multiple factors,¹ including the amount of time between the Flood and Babel.

Most commentators conclude that Genesis 10:25 (“for in his [Peleg’s] day the earth was divided”) is talking about the division of the nations at Babel and that the division occurred around the time when Peleg was born.² In the Masoretic chronology, he was born about 99 years after the Flood and lived for 239 years (Genesis 11:18).³ Some people are given nicknames later (see, for example, Genesis 17:5, 17:15, and 32:28), so we cannot know for certain when Peleg was given the name ‘Division’. All we can say is that Babel happened ‘one to three centuries after the Flood’ in the Masoretic chronology. Those advocating for the Septuagint chronology have an additional 430 years with which to work.⁴

The amount of time between the Flood and Babel is an important consideration once we begin to describe what people were doing before the Babel incident. Genesis 11:1 claims they all spoke the same language, and Genesis 11:4 says they intentionally came together to build a single city for themselves, “lest they become dispersed across the whole earth”. Before God confused their languages (Genesis 11:6–9), however, they lived in a homogeneous culture. In such a setting the family lines would be naturally comingled after just a generation or two, and there were five generations (at least in Peleg’s line) between the Flood and Babel.

This means that the resulting post-Babel people groups came from a well-mixed population and we should not expect many differences among them at the start.

Pre-Babel mixing and the origin of ‘races’

Historically, some have attempted to denigrate people of African descent by claiming Ham was cursed by God and the sign of this was the dark coloration of the skin of Africans. This is mainly an American phenomenon. The noted Welsh theologian Dr Martyn Lloyd-Jones said, “I have met some [Evangelicals in the United States] who base their whole attitude toward the coloured people on the fact that the latter are the descendants of Ham.”⁵ He knew this view was biblically incoherent, but, it was also genetically and mathematically ludicrous.⁶

First, Ham’s son Canaan was cursed (Genesis 9:25–27), not Ham. Second, Canaan’s descendants lived in what would later be called Israel (Genesis 10:19), not Africa. Also, the residents of the Mediterranean island of Crete (ancient Capthor) were descendants of Ham (Genesis 10:13). And Nimrod, one of the most famous descendants of Ham, lived in Mesopotamia (Genesis 10:8–11).

We are not actually told how the curse on Canaan would manifest itself, other than that Canaan would be a ‘servant of servants’ to his brothers. This has nothing to do with skin colour, and it is not clear that it had any future prophetic ramifications. Plus, mixing over the multiple generations before Babel would have spread both Ham’s and Canaan’s genes throughout the population.⁷ God separated the clans according to paternal (Y-chromosome) ancestry; skin colour genes are not carried on the Y chromosome.⁸ Thus, there is no way to get those genes into Africa only. Worse, the earliest Egyptian (African) mummies share little to no genetic ancestry with sub-Saharan Africans,⁹ so an even smaller group of Ham’s descendants have dark pigmentation than most people would assume. It is critically important to understand that all of the six founding members of the post-Flood population (Genesis 9:18–19) would have contributed approximately equally to all future populations.¹⁰

The belief that the descendants of Canaan are cursed with black skin is also genetically incorrect, as we can see many otherwise ‘African’ Y-chromosome lineages in Greece today,¹¹ probably a result of interactions between the Greeks and the Cretans over many centuries. There are also ‘African’ Y-chromosome lineages in Spain and Italy (not surprising, considering ancient history¹²), and also England (this was a surprise!¹³). So the biblically and scientifically ignorant people (mostly of European descent) who want to claim the Africans are cursed would also be cursing many of their fellow Europeans.

This is just an illustration to show that if we want to account for the origin of the Hebrews, or any other people group for that matter, we have to focus on the post-Babel time period.

The starting point of the Hebrews

Abraham is the father of the Hebrews. He was the 10th-generation descendent of Noah through Shem (Genesis 11:10–26) and it was with him that God made an important covenant (Genesis 15, 17). He was called a ‘Hebrew’ in Genesis 14:13.¹⁴ The word ‘Hebrew’ could also be translated ‘Eberite’ (Hebrew: עֵבֶרִי ‘Ibri, cf. עֵבֶר ‘Ēber). A great-grandson of Shem and the father of Peleg, Eber was an important patriarch in his own right. Hence, he is mentioned along with Shem in Genesis 10:21.

Thus, all of Abraham’s descendants are *technically* Hebrews/Eberites also. This includes his half-Egyptian son Ishmael (Genesis 16:15) (figure 1), who in turn took an Egyptian wife (Genesis 21:21) and had many sons that settled to the east (Genesis 25:12–18). But it also includes the six sons Abraham had with his third wife, Keturah, whose lineage is unknown. These also settled to the east, and in the account of Joseph the two tribes are discussed almost interchangeably (Genesis 37:25–28); that is, the Ishmaelites, who came through Sarah’s Egyptian servant Hagar (Genesis 16:1), and the Midianites, who came through Keturah (Genesis 25:1–6).

Later, Isaac’s son Esau married two Canaanites (a Hittite and a Hivite) and an Ishmaelite (Genesis 10:6,15; 26:34; 28:9; 36:1–3). These became the Edomite nation east of the Dead Sea (Genesis 33:16, Genesis 36).

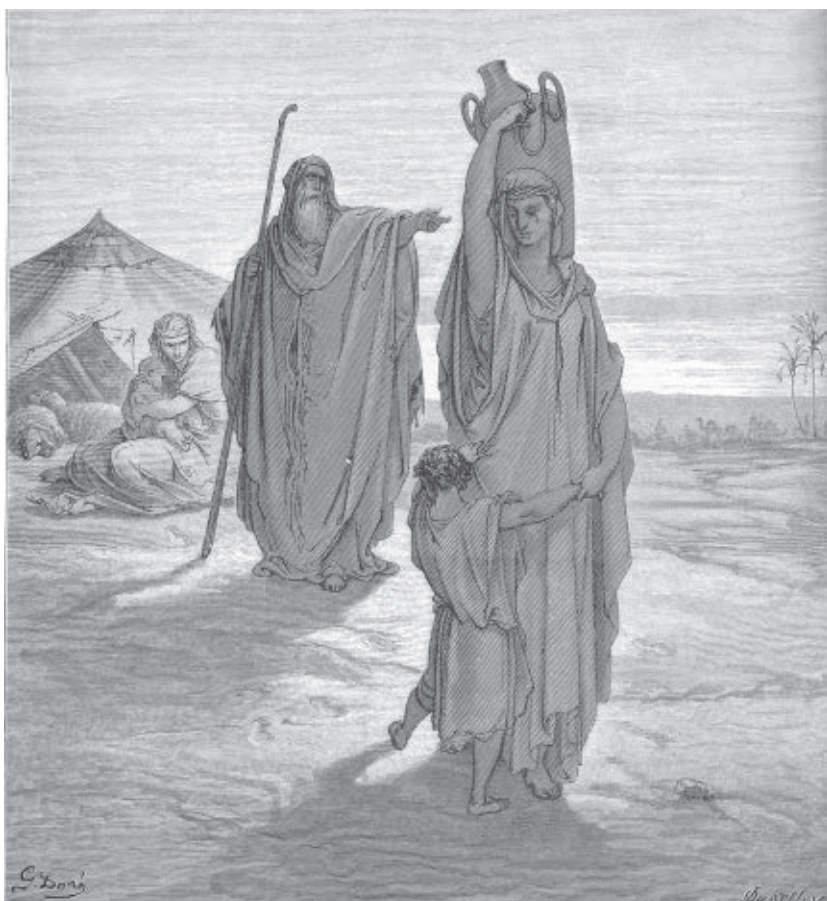


Figure 1. Abraham sends Hagar away (by Gustave Doré). This important biblical event led to the establishment of a major non-Jewish people group founded with Abraham's Y chromosome.

Lot was Abraham’s nephew, the son of Abraham’s (deceased) brother Haran. Two tribes that lived east of the Jordan, Ammon and Moab (Genesis 19:36–38), descended from him (figure 2).

As we narrow our focus to the origin of the Israelites, we need to remember that there would have been a significant diffusion of ‘Hebrew’ genes out into the surrounding nations, right from the start. But we also expect a reverse flow of genes from the surrounding peoples *into* Israel.

Abraham's servants

Abraham received menservants and maidservants from Pharaoh (Genesis 12:10–16). Since they came from Africa there is a strong possibility that many had African/Hamitic roots. When Abraham rescued Lot, he had 318 trained men “born in his house”. The household is numerically dominated by people not descended from childless Abraham. In fact, as late as Genesis 15:2–3 Abraham was worried that a relative named Eliezer of Damascus would be his heir.

Multi-generational non-descendants of Abraham were living among the future Israelite nation.

Abraham's household received another infusion of foreign blood when Abimelech, king of the Philistine city of Gerar (Genesis 20:2; 26:8), gave him additional servants (Genesis 20:14) after Abraham tried the same trick he pulled with Pharaoh.¹⁵ When God made his covenant with Abraham (Genesis 17), all males in the household, including Abraham, his son Ishmael and all the servants, had to be circumcised (Genesis 17:23–27). But once a male was circumcised, he would be considered under the covenant. Even though there would certainly have been issues of 'status' and 'place', what would have prevented intermarriage between the sons and grandsons of Abraham and the servants? It would have been more difficult (but not necessarily impossible) for a male to marry in, but the women would have been fair game, so to speak. Over time, therefore, the direct lineage of the Hebrews would have become more and more mixed in its genetics.

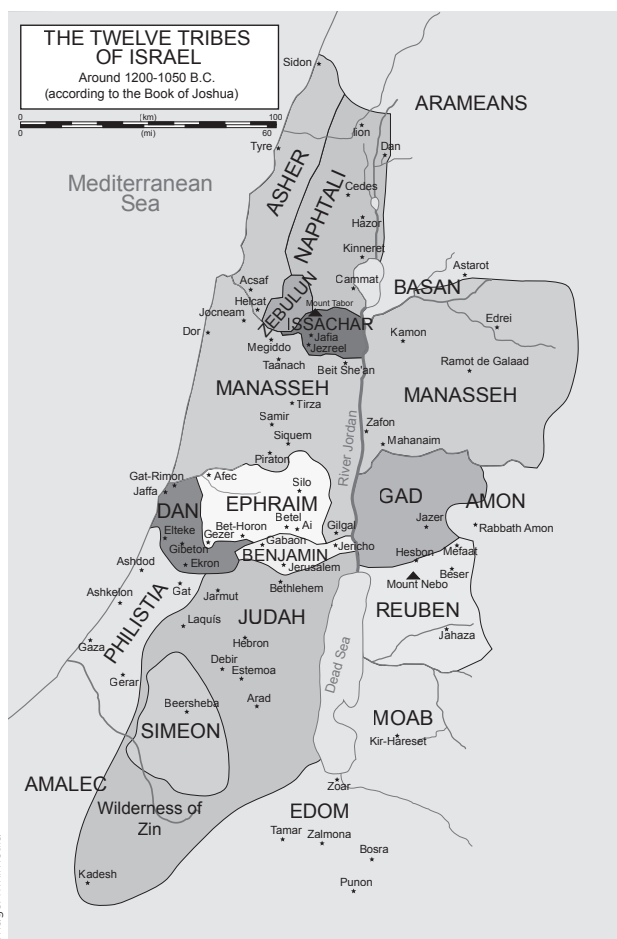


Figure 2. A map of the land allotted to the 12 Tribes and the surrounding nations. This is not the actual land occupied by the Israelites, for the Conquest was incomplete and many of the original peoples continued to live among them afterward.

But there remains an open question: What happened to the 'households' of Abraham and Isaac? Upon his return, Jacob initially lived separately from his brother and father (Genesis 35:1; 37:1). Later, he went south to Hebron before Isaac died (Genesis 35:27–28). This was where Sarah had died (Genesis 23:2), and probably Abraham (Genesis 23:19, 25:9). Jacob was living in Hebron when he sent Joseph to find his brothers (Gen 37:12–17), so he clearly settled there.

The ancient process for the division of property upon death of the owner was straightforward. There was no difficulty for Isaac, for his inheritance was never in dispute. But since Jacob was Isaac's heir (Genesis 27), and since Jacob was in Hebron when Isaac died, and afterwards, there should have been no legal dispute (and there is no evidence that Esau attempted one). Jacob would have received the lion's share of the wealth, goods, and servants from his father's house upon his death.

The starting point of Israel

An 'Israelite' is narrowly defined as a descendant of Jacob. They started off with a significant amount of inbreeding (Genesis 20:12; 24:24; 29:10, 27). We do not know the full ancestry of Leah and Rachel, and we know nothing of Bilhah and Zilpah other than their names, nor do we know the genealogy of most of the wives of the 12 Patriarchs. But, based on the parts of the family tree we have been given, the 12 Patriarchs would have inherited between 17% and 22% of Terah's genome, instead of the 1.6–6.3% expected after that many generations.¹⁶

Inbred populations have less genetic diversity. Yet, this would not have produced any 'new' genes, only changed the frequencies of the genes already there. And despite this starting point, it would not take much 'outbreeding' to get the diversity back up.

Even though '70 souls' went to Egypt during the famine (Genesis 46:26–27; Acts 7:14), these are specifically listed as 'descendants of Israel'. Nothing is mentioned about the others, but note that Genesis 46:1 says that Jacob took "all that he had" to Egypt. This does not specifically say they took the servants with them, but they were a major part of the household economy, were becoming more closely related over time through natural intermixing, and leaving them behind would almost certainly have consigned them to death by starvation.

Whom did the sons of Jacob marry? We have little information. Joseph married an Egyptian woman, Asenath (Genesis 41:45). Thus, two of the major Israelite tribes (Manasseh and Ephraim) had an Egyptian matriarch. Joseph had other children who became part of the general population (Genesis 48:6), and any daughters of Joseph would have also added North African mitochondrial DNA into Israel. Simeon had a son, Shaul, by a Canaanite woman (Exodus

6:15). The Shaulites are listed as a clan in Numbers 26:13. And Manasseh had a son through an Aramean concubine (1 Chronicles 7:14).

The tribe of Judah also has mixed origins. Judah had several sons by the daughter of Shua, a Canaanite (Genesis 38:2; 1 Chronicles 2:3). Judah's first two sons died because they were wicked (Genesis 38:8), but the third son, Shelah, had many descendants (1 Chronicles 4:21–22; Numbers 26:20). The woman involved in all this, Tamar, is of unknown ancestry, but would become the mother of twins by her father-in-law, Judah (Genesis 38:12–30), one of which (Perez) will be in the lineage of David and Jesus. We should also note that Judah's *intention* was to lay with a non-Israelite woman on the road to Timnah (Timnah was where Samson got his Philistine wife, Judges 14:1), with the potential that a child would result.

The beginning of the house of Israel included ample opportunity for mixing with other nations. It might be that many of the men in Israel would not, in the end, carry the Y chromosome of Jacob, let alone the mitochondrial sequences of the 12+ tribal mothers. But there is much more to consider before we can draw any conclusions.

The Exodus population

The Bible describes a 'mixed multitude' that left Egypt with the Hebrews (Exodus 12:38). These people incited the Israelites to sin (Numbers 11:4), and many died, but the question of who they were and how 'friendly' they and the Israelites were is an open question. Some may have started out in Pharaoh's household (Exodus 9:20). Many of them apparently made it through the wilderness (Deuteronomy 29:11). Sometime during the 40-year sojourn, a man with a Jewish mother and an Egyptian father spoke evil of God and was stoned (Leviticus 24:10–16).¹⁷

Moses married a Midianite woman (Exodus 2:16–22; 4:24–26). Moses sent her and their two sons back to Midian while he was in Egypt. They were re-united, however, and Moses' father-in-law, Jethro, became a trusted advisor to Moses. Jethro also displayed faith in God, sacrificed to God, and was accepted among the elders as they ate 'before God'. He then left to return to Midian (Exodus 18). The boys were counted among the Levites and held leadership roles (two of the grandsons were called 'chiefs'). Eliezer had but one son, but Gershom had many (1 Chronicles 23:14–17).

Later, Jethro is called 'the Kenite' and his descendants lived among the Israelites from the time of the conquest of Jericho (Judges 1:16, and see the account of Jael below). Centuries later, Saul sent them out of the way before he fought the Amalekites (1 Samuel 15:6).

During the Exodus, in a much-disputed passage, Miriam and Aaron complain about Moses' wife, who is twice called a Cushite (Numbers 12:1).¹⁸ The simplest, though not necessarily defensible, explanation is that Moses was not

yet reunited with his Midianite wife and sons, but that he had a second wife who was also not an Israelite.

Another example of a non-Jewish person in Israel might be Caleb, one of the 12 'spies' (Numbers 13:30). Caleb is called a Kennizite (Numbers 32:12) and the son of a Kennizite, Jephunneh (Joshua 14:6). The Kennizites were a Canaanite tribe (Genesis 15:19), which has raised the suspicion that Caleb was not a full-blooded Israelite. But perhaps Kenaz is simply a family name. Not only is Caleb's father called a Kennizite, Kenaz is also the name of Caleb's younger brother (Joshua 15:17; Judges 3:9), as well as one of Caleb's grandsons (1 Chronicles 4:15). Of course this could all just be useless speculation, and Caleb son of Hezron, son of Perez, son of Judah (1 Chronicles 2) and Caleb son of Jephunneh could be the same person. This is a mystery that cannot be answered here, but at least some of the evidence points to Caleb being half Kennizite. I include the argument only for the sake of completion.

Laws against intermarriage with foreigners are surprisingly few in the Bible. Deuteronomy 7:3 excludes Canaanites (Hittites, Girgashites, Amorites, Canaanites, Perizzites, Hivites, and Jebusites, 7:1) because they would turn away their hearts from following God (7:4). Deuteronomy 23:4–8 excludes Ammonites and Moabites from entering the assembly of the Lord to the 10th generation.¹⁹ But it allows for Edomites and Egyptians to enter the assembly in the 3rd generation. There is also a law for marrying foreign women taken captive during warfare (Deuteronomy 21:10–14; but see 1 Samuel 15:3), although this does not include the Canaanite nations and was restricted to maidens (Deuteronomy 20:15–17).

Joshua through to the Judges

When the Israelites entered the Promised Land (figure 3), we know they did not keep themselves separated from the Canaanite nations. Rahab, the Canaanite prostitute from Jericho, is famously in the lineage of Christ (Matthew 1:5), and even though they put her and her family "outside the camp" (Joshua 6:23), Rahab is said to have "lived in Israel to this day" (Joshua 6:25). Since she lived with the Israelites, even marrying one, there is a possibility that her family was also incorporated into the community.

Very early in the conquest of the Promised Land, the Israelites were duped by the Gibeonites (also called 'Hivites', in Joshua 9:7, and 'Amorites', in 2 Samuel 21:2).²⁰ The Israelites could not break the treaty they had made, so they allowed them to live in the land as servants (Joshua 9). This pattern of failed conquest repeats multiple times (Joshua 13:13; Judges 1:27–36). Once they started worshipping the Baals (Joshua 2:11), what would have prevented them from further rejecting God by marrying with the locals? After all, people as zealous as Phinehas (Numbers 25) are rare,

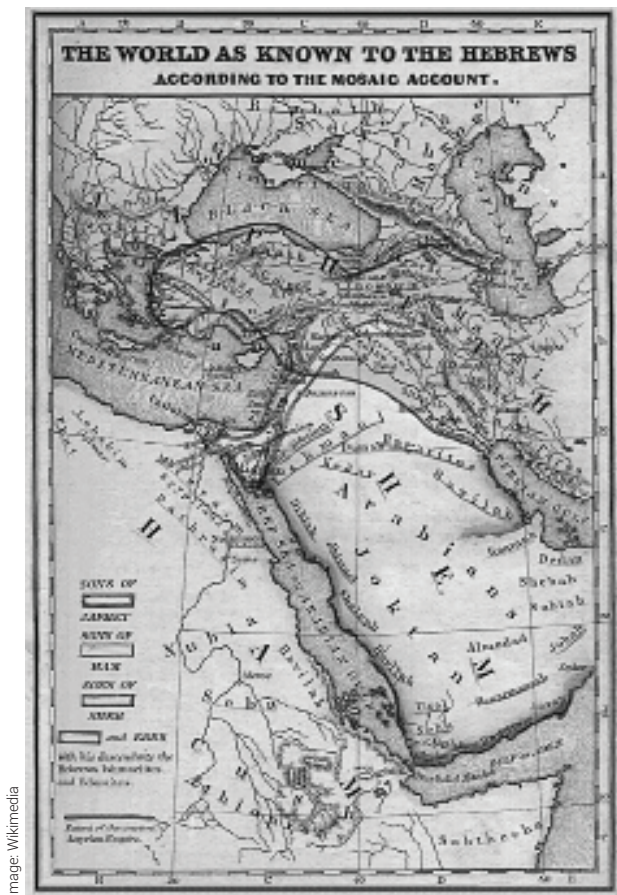


Figure 3. While this map is better than most attempts at delineating the geographic locations of the various biblical tribes, it fails to take into account that extensive mixing would continually be occurring among the neighbouring peoples. Also, the Table of Nations (Genesis 10) upon which it based was a one-off document that gave only a rough location of the tribes within a certain distance of the writer and at a specific time. Since humanity is in a constant state of flux, one should not assume this is a static situation. Genes ‘flow’ much more rapidly than most people assume, genetically homogenizing neighboring cultures. This is the reason why there are no ‘Jewish’ genes. They are a Middle Eastern people group, with typical Middle Eastern genes, who derive from a mixture of ancestral stocks, and who have mixed extensively with the people among whom they have lived from the ancient past until today.

and even prominent people in Israel (Numbers 25:14) were disobeying God by ‘interacting’ with outsiders.

Judges 3:31 and 5:6 give a brief mention of a judge named Shamgar, the son of Anath. His father’s name is decidedly non-Jewish.

Jael, who is known for having driven a tent peg through the temple of Sisera, the oppressor of Israel during the judgeship of Deborah (Judges 4), was married to Heber the Kenite. Jael is praised by Deborah and Barak (Judges 5: 6,24–27), and has an Israelite name meaning ‘ibex’, but she was married to a non-Israelite descendent of Jethro.

Sampson took a wife from the Philistines (Judges 14:1). The Philistines were in the land back in Abraham’s day

(Genesis 21:32). Archeologically and biblically they have deep connections with ‘Hamitic’ Crete (Deuteronomy 2:23; Amos 9:7; Jeremiah 47:4). After the murder of his wife, Sampson lay with a Philistine prostitute (Judges 16:1). Sampson’s more famous partner, Delilah, was also a Philistine (Judges 16:4). No children are recorded from any of his dalliances (legitimate or otherwise), but one can see the potential for genetic mixing among neighbours from this account.

Ruth, the great-grandmother of David (Ruth 4:18–22), was a Moabite (Ruth 1:4). As mentioned earlier, the Moabites descended from Abraham’s nephew Lot and one of Lot’s daughters (Genesis 19:37). They were also excluded from the assembly by Deuteronomy 23:4–8, which technically should have excluded Ruth and David!²¹ And even though they are recorded as having died, let us not forget that Naomi’s two Jewish sons had married Moabite women (Ruth 1:4).

David’s sister Abigail had a son named Amasa (who later joined Absalom in his rebellion) by a man named Jether the Ishmaelite (1 Chronicles 2:17; 2 Samuel 17:25–26). An even more distant relative of David had no sons, so he gave his daughter to his Egyptian servant Jarha, who then founded a long line of descendants (1 Chronicles 2:34–41), all of whom would have carried an Egyptian Y chromosome. This is the second mention of a non-Israelite Y chromosome entering the population (this time successfully), but certainly these are not all! Yet another distant relative of David, a man named Mered, had two wives. One of them is named Bithiah, the daughter of Pharaoh, through whom he had three children (1 Chronicles 4:17–18).

Kingdom period

Since she is the mother of King Solomon (2 Samuel 12:24), Bathsheba has an important role in biblical history. Although her name (“daughter of an oath”) is clearly Hebrew in origin, she was first married to Uriah, the Hittite (2 Samuel 11:3). The Hittites are mentioned several times in the Bible (see Genesis 23 for example). If she and Uriah had any children, what would their status have been?

After David became king, he wanted to bring the Ark of the Covenant from Kiriath Jearim, where it ended up after the Philistines returned it (1 Samuel 6:1–7:2), to Jerusalem. But after Uzzah was killed when he touched the Ark, they brought the Ark to the house of Obed-Edom the Gittite. God blessed Obed-Edom while the Ark was with him (2 Samuel 6:5–12). Was he a Philistine, as his name might suggest?²²

David also married Maacah, daughter of the King of Geshur (2 Samuel 3:3; 1 Chronicles 3:3) and mother of Absalom and Tamar (2 Samuel 13:1). Tamar’s status as a half-breed technically excluded from the ‘assembly’ partially explains the tragic episode of 2 Samuel 13. But Absalom’s

subsequent coup d'état should never have occurred (because the Geshurites were Philistines) if the rebels had been following the Law even in its loosest sense. David had many wives and concubines (2 Samuel 5:13), but we do not know all their names and ancestries.

The rebellion of Absalom gives us another interesting anecdote that might explain the presence of Obed-Edom in Israel. While David was escaping Jerusalem, the Bible says that 600 Gittites had followed him from the Philistine city of Gath, where David once served in their army while on the run from Saul (1 Samuel 21:10–15; 27:1–12). When told to return to his kin, Itai the Gittite replied in terms that clearly demonstrate he was a believer in the Israelite God. David allowed them to stay among his army (2 Samuel 15:18–22). Since there is no specific biblical prohibition against marrying Philistines, the grandchildren of these faith-displaying men would have been accorded full rights in Israel, and their Y chromosomes would then have become 'Jewish'. There is no specific information that these men contributed Y chromosomes to the future population of Israel, but the potential for it is strong.

Perhaps the most famous extra-Israelite marriage was that of Solomon and the daughter of Pharaoh (1 Kings 3:1). Of course, Solomon married *many* foreign wives, including Moabites, Ammonites, Edomites, Sidonians, and Hittites (1 Kings 11:1), directly ignoring the specific injunctions against doing so.

Ebed-Melech was an Ethiopian living in Israel during the time of Jeremiah (Jeremiah 38:7–13). He trusted God (Jeremiah 39:18) and so God blessed him. Of course, the Ebed-Melech example is a poor one, for he was a eunuch.

Yet, not only is there opportunity for the genes of the Israelites to mix with their neighbours, so can their faith. Besides Ruth and Rahab, additional examples include the widow of Zarapeth (1 Kings 17), Naaman the Syrian (2 Kings 5), and the Queen of Sheba (1 Kings 10:1–13). One final example is the sailors who threw Jonah into the sea. After the sea suddenly quieted, they “feared the LORD exceedingly, and they offered a sacrifice to the LORD and made vows” (Jonah 1:16). Marriage between an Israelite and a non-Israelite is not part of these latter examples, but the potential is there.

Captivity to Christ

There are many references to intermarriage in the rest of the Old Testament. We have Esther, although no children are reported. And consider Ezra 9–10 (also Nehemiah 10:28–30 and 13:23–29). Here, many men admitted to marrying foreign women. Many of the wives and children were subsequently excluded. But these children would have gone on to have families of their own, further

spreading Jewish genes into non-Jewish peoples. Although many commentators compliment them for their renewed dedication, they had forgotten their Bible, for in Ezra 9:1 they lumped the Egyptians with the Canaanites, Ammonites, and Moabites. Malachi complained about intermarriage, wishing that God would “cut off from the tents of Jacob any descendant of the man who does this” (Malachi 2:11–12). He was more concerned with removing the temptation to sin than with accepting faithful converts. Of course, the influence of foreign wives (specifically) was a constant problem throughout Israel's existence, so his comments were prophetically justified.

New Testament

Herod the Great was of Edomite descent. He was raised in the Jewish religion and married a woman from Nabatea (the former lands of Moab and Edom).²³ The Edomites were forcibly converted to Judaism by John Hyrcanus in the 2nd century BC, leading to much intermarriage.²⁴

Another mixed individual was Timothy, whose father was Greek. Even though he was a believer, he was not circumcized until Paul decided to take him with him on his journeys (Acts 16:1–3). Timothy is not known to have married, but here we see another example of a person with a non-Jewish Y chromosome being admitted into fellowship with Jews.

Timothy was part of the Diaspora population. That is, Jews who lived in places other than Israel. This included Jews dispersed during the Assyrian and Babylonian conquests. Many Jews also lived throughout the Roman World (Acts 2:9–11) and beyond (Acts 8:26–28). There were also many converts to the faith (e.g. Acts 2:11).

Lastly, the Bible does not tell us which direction the wise men who visited Jesus came from other than “from the East” (Matthew 2:1–12). Yet, one could make a case that they were from Babylon, for Daniel was chief of the wise men of that city (Daniel 2:48), and the Jews have maintained a presence there from the Captivity to today.

Conclusions

It is clear from biblical history that Jewish people were a *mélange* of themselves and their neighbours. They began with mixed roots early and continued mixing throughout the rest of the biblical era. In attempting to be thorough, I have listed several controversial points above, but even if these are removed the case is still clear. Yes, the Israelites are a people group, but no, they did not remain separate. Just as there is no clear Jewish bloodline, given the numerous genealogical data presented in the Bible, there is also no clear 'Jewish' DNA. Instead, they are a typical Middle Eastern population (often

living for millennia among non-Middle-Eastern people), who started out with typical Middle Eastern genes and ended up with a typical Middle Eastern network of relationships with their neighbours.

When looking at people groups across the world, should we expect to see ‘three’ (the descendants of Shem, Ham, and Japheth) or ‘16’? The number of groups descending from Noah in Genesis 16 ... ? Not all of those listed are grandsons. Rather, many people groups (-im) are included in the list. We should expect neither, because we have every reason to expect their lineages to have intertwined extensively. The Bible lists the patriarchal founders of multiple people groups, but each of those groups had their own complex interactions with their respective neighbours, which would create extensive co-mingling of the different lineages. The Jewish nation just happens to have a detailed record of their beginnings and of their interactions with other peoples over time. Thus, they can be used as a model of what we should expect when asking questions about race.

Acknowledgments

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7. Some creationists have portrayed Ham’s wife with both Asiatic and African facial features and a medium-brown skin tone, supporting the idea that Africans and East Asians derived from Ham. But population-specific racial features must have developed independently, in isolation, *after* Babel.
8. Human skin pigmentation is under complex control. To date, the main known drivers are variants in the LC24A5 gene (chromosome 15), but other variants have been discovered on chromosomes 3, 5, 10, and 20, and perhaps others. For a recent study on the subject, see Hernandez-Pacheco, N. *et al.*, Identification of a novel locus associated with skin colour in African-admixed populations, *Sci. Rep.* 7:44548, 2017.
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11. Slatkin, M. and Racimo, F., Ancient DNA and human history, *PNAS* 113(23): 6380–6387, 2016. The most common Y-chromosome haplogroup in Africa is E. It may not have originated there but it certainly dominates the genetic landscape today. But we can also trace the branches and sub-branches of haplogroup E, and clearly many ‘African’ E chromosomes have entered Europe over the centuries.
12. Consider the Punic Wars and the Moorish invasion of Spain. We also see many deeply rooted African Y chromosomes among otherwise European people groups within the 1,000 Genomes data, etc.
13. King, T.E. *et al.*, Africans in Yorkshire? The deepest-rooting clade of the Y phylogeny within an English genealogy, *European J. Human Genetics* 15: 288–293, 2007.
14. This was right before he tithed to Melchizedek. Many commentators have concluded that Melchizedek was either a pre-incarnate Christ (after considering Hebrews 7:3b), or that he was the patriarch Shem. Sarfati (*The Genesis Account*, p. 647, footnote 28) notes that the first option is theologically problematic and that there is no biblical evidence for the second option. If one was searching for a biblical person to fill this role, the appearance of the word ‘Eberite’ in close proximity would better indicate that Melchizedek was Eber. But this is just as speculative as the other ideas, especially since Hebrews 7:3a says his ancestry is unknown. Also, if the LXX carries the correct chronology, both Eber and Shem were long since dead by this time.
15. Isaac did not receive anything but approbation from (possibly a different) Abimelech (the title of the ruler) when he followed in his father’s footsteps years later (Genesis 26:6–11).
16. Carter, R., Inbreeding and the origin of races, *J. Creation* 27(3):8–10, 2013; creation.com/inbreeding.
17. Note that he was not called an ‘Israelite’, which is evidence that back then Jewish descent was patrilineal.
18. Josephus said that Moses had married an Ethiopian princess before he fled Egypt (*Antiquities of the Jews* 2:10–11). More recent commentators suggest that Zipporah had died and Moses married an Ethiopian woman who was part of the multitude, or else Miriam just insulted Zipporah by calling her a Cushite.
19. Compare this to a similar exclusion to the 10th generation of children born out of wedlock (Deuteronomy 23:2).
20. Amorite > Canaanite > Hivite > Gibeonite.
21. Most people conclude this must be talking about the male line only. Since Ruth was David’s great-grandmother, he would not have fallen under the moratorium if this were so. The alternative is that David was guilty under the Law, that he was imperfect, and that he could not have stood in for the Messiah even though he was “a man after God’s own heart”. Notice that his son Solomon would later marry multiple women excluded by this same law. Israel was ignoring the prohibitions set up by God.
22. Compare references to his name in 1 Chronicles 13, 15, 16, and 26.
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Thoughts on the nutritional challenges faced by felines

Warren Shipton

Felines are regarded as obligate carnivores as reflected by their nutritional requirements. Special needs exist for several amino and fatty acids and selected vitamins. Examination of the enzymatic pathways connected with supplying these nutrients indicate that over- or underactivity of enzymes is the primary cause of the problem. The question of how felines lost key biosynthetic capabilities on becoming wild can be answered partially by studying changes that occur in animals that have become tame. Taming of animals leads to changes in morphology, physiology (particularly relating to hormone levels) and behaviour. Feralization also leads to changes, but not necessarily the exact reverse. Modern genetics has shown that mutations of genes, gene duplication, changes in the promoter region, epigenetic alterations and other phenomena may be involved in alterations in enzymatic activity. Loss-of-function mutations may be responsible for the failure of cats to retain a well-recognized carbohydrate metabolism. A similar explanation may account for the apparent loss of one key enzyme needed for vitamin A biosynthesis.

The original arrangements made at the creation of the world are briefly sketched in the initial chapters of Genesis. By reference to the ideals outlined by Isaiah (11:6; 65:25) and the statement by the Apostle Paul (Romans 8:22), we conclude that there was an absence of pain and suffering in the beginning. As a consequence of this perceived general arrangement, in the paradise to come, those carnivorous animals represented will have alternative food sources; i.e. alternative to having to capture and consume feeling animals, birds, and the like.

This poses a potential problem for creationists in that a rational explanation needs to be formulated on how the transition to flesh eating took place. One possibility appears to be suggested in Job 38:39–41 and Psalms 104:21; 147:8, 9. The indication seems to be that God had a key involvement in the transition. All sorts of issues are faced when attempting to address these concerns using naturalistic explanations and one should not imagine that every enigma can be resolved. In some cases, the relevant scientific observations have not yet been made and in other instances associations have not been recognized. For these reasons, I have chosen to comment on the nutritional problems facing felines and how relatively small changes in gene functioning might be used to explain the acquisition of a carnivorous habit.

Special nutritional requirements

All members of the Felidae (cats: cheetahs, lions, tigers, leopards, etc.) are carnivorous and have facial nerve and taste buds that are not responsive to sugars, presumably on account of their adaptation to a meat diet.¹ Cats have special dietary requirements for the amino acids arginine

and taurine and for vitamins A, D, and niacin (vitamin B₃). In addition, they have a high protein intake need and a requirement for linoleic acid (omega-6) and a conditional need for linolenic acid (omega-3) during gestation and lactation^{2,3}—refer to table 1. Such requirements place them in the obligatory carnivore category of animals.⁴

For most of the nutrients mentioned above, biochemical pathways for synthesis and/or retrieval exist but their activity levels are either too low or over-expressed (table 1). The recitation of a few details will help with understanding. The high protein requirement of cats, due to the high demands made on amino acids to supply the glucose requirements of the animals, is unusual.⁵ With most animals, when the level of dietary protein varies, there is a capacity to adapt the metabolic machinery to either dispose of excess material or conserve amino acids. Cats are able to make some adjustments in enzyme adaptation but are unable to fully adapt to changes in protein levels. The enzymes involved in the excretion of nitrogen products fail to reduce in activity when protein levels are lowered; hence, there is a greater level of loss of nitrogen from the body.

They also show a dietary need for taurine, which is a β -sulphonic amino acid found free in animal tissues. The amino acid cysteine is a precursor for taurine, but the level of activity of two critical enzymes (cysteine dioxygenase and cysteine sulfinate decarboxylase) in the pancreas limits its synthesis.^{3–6} Taurine has a number of physiologic functions, one of which is the formation of bile salts. Placental animals sometimes use glycine to replace taurine for conjugation with bile acids to produce bile salts. The cat, however, is not able to do this on account of the low affinity of the requisite enzyme for this substrate, and in this respect

they are like the non-placental animals.^{3,7} The level of wastage of taurine also is high as recovery by the kidney is not efficient by comparison to the pattern shown in other animals. Cats also have a requirement for arginine and are very susceptible to a deficiency in this amino acid. Arginine is synthesized from glutamine/glutamate. The issue is that cats have a low ability to reduce glutamate to pyrroline-5-carboxylate (a synthetase enzyme is involved). Also, the enzyme involved in the synthesis of citrulline from ornithine (ornithine aminotransferase; this represents the next step in the synthetic pathway) displays low activity in the intestine. Citrulline produced in the intestines is converted to arginine in the kidneys. Since cats can synthesize only minimal citrulline, arginine must be supplied in the diet. In practice, equal amounts of soy protein and casein can provide cats with sufficient arginine to prevent disease.^{3,4}

The essential and conditionally essential fatty acid requirements of cats include linoleic (omega-6) and linolenic acids (omega-3), respectively. Cats have a limited ability to transform linoleic acid (in vegetable oils) to arachidonic acid,⁸ which most other mammalian species have the ability to accomplish. The limited ability demonstrated is again due to poor enzymatic activity of the appropriate type, not its absence (table 1). Especially formulated diets containing maize oil supplemented with docosahexaenoic acid (omega-3) support balanced development.^{3,4} A plant source (algal) of the docosahexaenoic acid also exists.⁹

Cats are unable to synthesize vitamin A from precursor molecules.¹⁰ This is on account of the enzyme responsible not being present in tissues normally containing it in other animals. They can also tolerate high levels of the vitamin in their plasma without showing signs of toxicity. On the other hand, when it comes to vitamin D needs, the problem is that a dehydrocholesterol reductase enzyme that reduces dehydrocholesterol to cholesterol is present in the skin but it has high activity and hence reduces the availability of the appropriate substrate (dehydrocholesterol) from which the nutrient could be synthesized. Again, with niacin synthesis (vitamin B₃) all the enzymes required for its production are present, but the activity of a key enzyme in one branch of the degradative pathway (picolinic carboxylase, now 2-amino-3-carboxymuconate-6-semialdehyde decarboxylase) is extremely high. This enzyme ensures that there is little of the common substrate (aminocarboxymuconic semialdehyde) left from which niacin can be synthesized via the other branch of the pathway. This means that the production of meaningful quantities of the vitamin from dietary tryptophan is precluded in the cat (domestic animals studied).^{3,11}

Reason for the observed deficits?

Evolutionary biologists explain the pressures of adopting a meat diet as being responsible for the apparent deletion

Table 1. Summary of the special nutritional requirements shown by the Felidae, the key enzymes involved, and aspects of their activity levels

Special nutritional requirements	Key enzymes involved	Level of enzyme activity	Reference
Arginine	Ornithine aminotransferase; proline-5-carboxylase synthetase	Both low activity	Morris, ref. 3; Verbrigghe and Bakovic, ref. 4.
Taurine	Cysteine dioxygenase; cysteine sulfinic acid decarboxylase	Both low activity	Knopf <i>et al.</i> , ref. 6; Morris, ref. 3; Verbrigghe and Bakovic, ref. 4; Vessey, ref. 7.
Vitamin A	β carotene to retinol conversion (a carotene oxygenase)	None apparent	Knopf <i>et al.</i> , ref. 6; Morris, ref. 3; Zoran, ref. 10.
Vitamin D	Dehydrocholesterol reductase enzyme	High activity*	Morris, ref. 3
Vitamin B ₃	Picolinic carboxylase	High activity*	Morris, ref. 3
Linoleic acid (omega-6)	Δ5 desaturase; Δ6 desaturase	Both low activity	Pawlosky <i>et al.</i> , ref. 8; Trevizan <i>et al.</i> , ref. 8.
Linolenic acid (omega-3)—conditional	Docosahexaenoic pathway enzymes	Low activity of some enzymes	Morris, ref. 3; Verbrigghe and Bakovic, ref. 4; Bauer, ref. 2; Filburn and Griffin, ref. 2.
High protein intake	Aminotransferases, urea cycle enzymes	Fail to adapt fully to changes in protein levels	Eisert, ref. 5; Morris, ref. 3; Verbrigghe and Bakovic, ref. 4.

* High enzyme activity results in less vitamin D and B₃ due to reduced availability of the appropriate substrate material on account of alternative pathway utilization.

(affecting one nutrient) or changes in enzyme activity (affecting four nutrients) seen in cats.³ The basic proposal that dietary changes have exerted selective pressures, resulting in obligate nutrient requirements now being shown could be accepted by creationists too.

The regulation of gene expression can be accomplished through the operation of multiple mechanisms. For example, the loss of a functional enzyme required in vitamin A synthesis could be the result of disabling mutations in the gene or its promoter, or it could be accomplished through gene silencing. With the other nutrients, the over- and underexpression of enzymatic activity might be explained by changes in the promoter region of the DNA (mutations in promoter elements may alter the transcription rate), changes in gene enhancers, in specific hormone receptors, or to the activity of micro- and circular-RNAs, and aberrations in gene arrangement, and possibly other mechanisms.¹²

One very real issue with providing an entirely satisfactory account of how changes in enzymatic activity might have occurred is that few studies have been completed on felines outside the domestic cat (*Felis silvestris catus*). This means that studies with other animals must be relied upon to provide possible clues. If the vitamin D deficiency experienced by cats is taken as an example, the overactivity of the dehydrocholesterol reductase enzyme is problematic (table 1). If the activity of this enzyme is reduced experimentally by feeding an enzyme inhibitor in the diet, then adequate dehydrocholesterol is found in the skin and vitamin D is able to be synthesized in adequate quantities.³

Studies using rat cells have shown that the activity of the same enzyme in this animal can be changed through point mutations introduced into the promoter region of the gene involved. Depending on the position of the mutation, sterol synthesis can be up or down regulated.¹³ Among the human population, variations in dehydrocholesterol levels have been linked with mutations in the 7-dehydrocholesterol reductase gene. Furthermore, the position of mutation (amino acid affected) varied with geographical location. In northern climates there was a more frequent appearance of variants, allowing higher levels of dehydrocholesterol in the skin and hence permitting a greater ability for its conversion to vitamin D on exposure to the limited ultraviolet light found at those latitudes. Accordingly, it has been noted that not all mutations linked to this gene are associated with disease.¹⁴ Such mutations in the promoter region of the cat's gene conceivably could have produced similar dampening effects on enzyme activity. Understandably such changes would have to exert minimal changes on other metabolic pathways.

Generally, humans and many mammals are able to synthesize vitamin A from provitamin A carotenoids available in plants. The absence of carotene monooxygenase/dioxygenase activity in domestic cats precludes their ability to cleave the carotene molecule and hence negates their capacity to synthesize vitamin A. Many felines show moderate to high serum levels of precursor molecules, but their ability to convert these to vitamin A is unknown.¹⁹ Until the genome and enzyme function in a number of felines has been studied in detail, the question will be

Table 2. Some alterations of enzyme activity noted in placental animals following artificial or natural changes in heritable material

Nutrient	Key enzymes implicated	Level of enzyme activity found in felines	Events altering enzyme activity	Animal involved
Arginine	Ornithine aminotransferase; proline-5-carboxylase synthetase	Both low activity	Transgenic alterations increase activity; autosomal recessive state or mutations decrease activity. ¹⁵	Mice, humans
Taurine	Cysteine dioxygenase; cysteine sulfinic acid decarboxylase	Both low activity	Selective breeding lowers activity. ²⁴	Dogs
Vitamin A	β carotene to retinol conversion (a carotene oxygenase)	None apparent	Mutations deliver losses of activity. Knock-out mice lack activity. ^{20,22}	Cows, humans, mice, sheep
Vitamin D	Dehydrocholesterol reductase enzyme	High activity	Promoter mutations/ other mutations produce increase/decrease activity. ^{14,15}	Humans, rats
Vitamin B ₃	Picolinic carboxylase	High activity	Targeted promoter changes increase/decrease activity. ¹⁶	Mice
Linoleic acid (omega-6)	$\Delta 5$ desaturase; $\Delta 6$ desaturase	Both low activity	Transgenic alterations increase/decrease activity, Insertion/deletion polymorphisms influence activity. ^{17,18}	Mice, humans

unresolved as to whether the appropriate gene for vitamin A synthesis has been deleted, inactivated, or simply displays extremely low activity.

In other animals, mutations in the gene coding for the carotene dioxygenase enzyme have been noted (chickens, cows and sheep), which caused a deep yellow colouration of their tissues.²⁰ In fact, in chickens the appearance of a yellow skin was indicative of mutations rendering the dioxygenase enzyme ineffective in that location.²¹ In humans, severe biochemical vitamin A deficiency has been noted as a result of specific missense mutations. However, these may lead only to mild clinical symptoms, such as night blindness. No systemic disease symptoms were noted in one of these studies, suggesting that the mutations were affecting other pathways than those usually considered in the cellular supply of vitamin A to tissues.²²

Taurine is an abundant free amino acid, found in the tissues of mammals, that protects cells from various categories of injury. The taurine requirement of felids is well known (figure 1). They possess the requisite biochemical pathway in the liver for the synthesis of taurine but the activity of the two key biosynthetic enzymes (cysteine dioxygenase and cysteine sulfinic decarboxylase) is low. The problem is heightened as there is no capacity to substitute proline for taurine in the conjugation of bile acids to produce bile salts either. In addition, reutilization of taurine is regulated by a taurine transporter (kidney) and this is not as efficient as desirable.³

In animal studies, key enzyme activity affecting taurine status is regulated by the dietary proteins, methionine and cysteine. For example, the presence of cysteine or methionine in the diet upregulates cysteine dioxygenase activity. Besides dietary factors, hormone levels influence cysteine sulfinic activity. Thyroid hormone levels have been found to exert a differential effect on activity of this enzyme in the liver as against the kidney. Finally, the taurine transporter gene contains a promoter region that possesses several regulatory elements that can influence transport activity so that it can be up- or down-regulated by manipulation of nutrients and salts. In humans, activation has been shown to be hormone associated.²³ What influence changes in coding sequence in this region might have on the uptake of taurine in cats awaits discovery.

Of relevance to our discussion on taurine is the observation that certain breeds of dog (American Cocker Spaniels, Newfoundlands and Golden Retrievers) have poor taurine synthetic capacity in comparison to many other breeds, which makes them susceptible to cardiopathy (chronic disease of the heart muscles). The feature is shared with foxes.²⁴ This suggests that selective breeding has

been responsible for the emergence of poor taurine synthetic ability in the breeds of dog mentioned and further indicates that their progenitors were functionally more robust.

Arginine is a nutrient of particular significance to cats on account of their low synthetic ability, which leads to the development of hyperammonaemia. This condition is characterized by excess ammonia in the blood, leading to neurological and other disorders. There may be differences in the expression of deficiencies among animal groups. For example, hyperammonaemia is capable of developing in dogs in the absence of arginine, but in rats only appetite depression is seen.²⁵ Mutations may change the activity of one key enzyme involved in supplying arginine in selected animals (table 2). Whether restorative changes are possible in cats awaits discovery. Strong selective pressures have been exerted on cats as a result of domestication and selective breeding. For example, mutations have been identified associated with coat colour changes, and recombination events have been implied in explaining retinol metabolism and dark adaptation capabilities.²⁶

Transgenic manipulations are used to research biochemical pathways. Increases and decreases in key enzyme activity levels can be achieved through such manipulations (table 2), and are indicative of possibilities in the natural world. Besides changes in the gene sequences, the up- or down-regulation of various biosynthetic pathways can be altered by nutrients, salts, hormones, and drugs (examples: table 2, references for vitamins D and B₃). Information relevant to felines is largely absent, but from the information available with other placental animals, it would not be surprising to find similar associations.

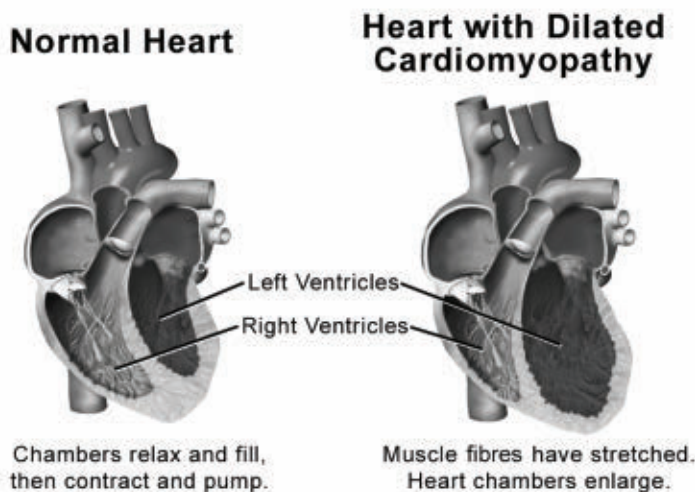


Figure 1. Dilated cardiomyopathy in a human heart. The ventricles have been remodelled as a consequence of disease progression. A similar condition is shown in cats as a result of taurine deficiency.

Table 3. Effect of domestication on morphology, physiology, and behaviour found in some rodent, canine and feline lines in nature

Feature involved	Animal involved		
	Rats	Fox and other Canidae	Cats and other Felidae
Morphology	Smaller adrenal glands; changes in spleen and smaller brain size, reduced ears and adrenal glands, depigmentation. ^{30,52}	Tail curling, shorter tails and legs, reduced and drooping ears, cranial feature change, smaller brain, teeth, and adrenal glands, right heart ventricle enlarged, depigmentation. ^{27,44,52}	Reduced robustness, shrinking of teeth and jaws, shortening of limbs, reduction of braincase, modification of tail. ²⁹ Longer intestines, depigmentation. ^{26,45}
Physiology	Hormone down-regulated with lowering of aggression; mutation also changes levels. ³⁰ Polyoestrous. ⁴⁵	Hormone levels down-regulated with lowering of aggression. Changes noted in selected enzyme activities and receptor density. ²⁷ Polyoestrous. ⁴⁵	Hypothalamic stimulation increases aggression. ³¹ Changes noted in neurotransmission receptors. ²⁶ Polyoestrous. ⁴⁵
Behaviour	Seek human contact, lack of aggression displayed; brain gene expression changed. ³²	Docility displayed, seek human contact, sniff, lick, and whimper to attract attention. ^{27,45}	Docility and gracefulness shown. ²⁶ Friendliness (approaching, sniffing, rubbing)—inherited. ³³ Aggression heightened by inbreeding. ³⁴

Consequences of animals becoming wild?

We well remember that after the universal Flood experience, God put the fear of humans into members of the animal kingdom (Genesis 9:2). This presumably resulted in friendly relationships turning first to uneasy ones and ultimately to the emergence of lines of animals focused on avoiding humans and perhaps hunting for their food for the first time. Theoretically, the reverse process should be possible (taming). Indeed, taming has been shown with foxes, otters, rats, and other animals, although I am not inferring that becoming tame involves an exact reversal of events occurring in animals becoming wild.

**Figure 2.** The common white (albino) laboratory rat characterized by its docility

Experiments with the silver fox (*Vulpes vulpes*), begun by a Russian scientist, Belyaev, have shown conclusively that selection for temperament alone will lead to changes in morphology, physiology, and behaviour (table 3). The expression of hormones and neurochemicals (corticosteroids and serotonin) governing the new-found behaviour in these animals is also different from that in their wild relatives. These features involve changes in the regulatory mechanisms of the body and hence the developmental pathways. The changes were found in a population where mating was strictly controlled to prevent inbreeding. And, furthermore, some of the features noted were determined not by recessive genes but by dominant or incompletely dominant ones, such as in tail curling, drooping ears, and brown spots on the neck and ears.²⁷ One unusual coat colouring pattern (piebald) appears to be due to gene activation as a result of selection for tameness.²⁸

Selection for tameness influences hormonal control, and this could account for some of the features observed (table 3). Such changes regulate gene function and development. Selection is thought to eliminate mutations that interfere with the phenotype being selected for rather than induce them. This also means that characteristics that were muted previously might now be expressed.²⁷ In other animals, such as rats (table 3, figure 2), tameness is also associated with changes in

brain biochemistry, involving signalling molecules and their appropriate receptors. Furthermore, some of the changes noted with foxes involved greater enzyme activity (tryptophan hydroxylase) being displayed in the midbrain and hypothalamus in the tame animals. Serotonin receptor density also was greater in the domestic than in the wild specimens.³⁵ A linkage point between experiments in tameness and aggression in response to nutritional stress is that selective pressures are capable of altering the level of enzyme expressed. Also, alterations in hormone levels exert wide-ranging effects.

Two further approaches have provided limited insights into the possible effects of selective pressures on nutritional requirements. The first relates to carbohydrate utilization. In omnivores and vegetarian animals, carbohydrate metabolism is of considerably greater significance than in carnivores. The activity of glucokinase is lower in the liver of cats than in that of omnivorous animals. Further, pancreatic amylase activity and intestinal amylase activity is much higher in dogs than cats. Phosphoenolpyruvate carboxykinase activity, which is vital in the synthesis of glucose, is not stimulated by high protein levels. This and other observations indicate that the metabolic machinery of cats is more responsive to the presence of amino acids than to glucose.²⁵

An interesting feature of phosphoenolpyruvate carboxykinase is that the expression of the gene can be influenced by transcription factors in the promoter region that responds to the dietary and hormonal status of the animal. Hormonal control is exerted by glucocorticoids, glucagon, thyroid hormone response element, and insulin. Levels may be overexpressed by some activators.³⁶ In humans, dehydroepiandrosterone-adrenal hormone activity changes gene expression of the phosphoenolpyruvate carboxykinase enzyme.³⁷ The hormone is involved in the stress response and hence is influenced by the level of tameness/aggression.³⁸ It would be interesting to follow the response of this enzyme in cats to variations in hormone levels.

Another aspect of the phosphoenolpyruvate carboxykinase enzyme is that maternal nutrition may have marked effects on expression of the gene regulating the enzyme in the foetus and even influence renal structure of some placental animals. The influence of nutrients on gene expression is considered in the field of epigenetics. Here it is found that gene activity and expression are influenced by such events as the methylation of DNA and histone modifications rather than through changes in the DNA sequence.³⁹ For example, with phosphoenolpyruvate carboxykinase enzyme activity in baboons, methylation status was reduced following maternal nutrient reduction. Epigenetic effects may persist after birth and beyond the initial generation.⁴⁰ Evidence is becoming strong

that the periconception nutrition environment can exert trans-generation, or perhaps even permanent, changes.⁴¹ Epigenetic modifications influence hypothalamic neurons and hormone receptors among other features, which means that nutritional events occurring in dams may exert significant effects in the offspring.⁴² No information is yet available on the significance of this phenomenon for the Felidae. The imposition of nutritional stress at the same time as other stressors were operating would exert unique selective pressures on animals.

Another approach is to compare the genomes of animals sharing a common ancestry. For example, if the assumption is correct that grey wolves and domestic dogs (diversity of breeds) share a common ancestry,⁴³ then recent analyses of wolf and dog genomes are significant. A number of genomic regions have been identified where selection ostensibly took place (nineteen dealing with brain function, eight with nervous system developmental pathways, and ten with starch digestion and fat metabolism). The changes dealing with starch metabolism are particularly interesting. The process involves the activities of first an amylase, then maltase-glucoamylase and other enzymes, and finally uptake of glucose through a transporter. For example, the portion of the DNA sequence determining amylase activity appears to be represented by multiple copies in the dog compared to much lesser numbers in the wolf. This resulted in an increase of amylase activity by a factor of almost five in dogs. When the maltase-glucoamylase enzyme was investigated, the most likely candidate phenomenon was identified as mutational change affecting nucleotides that are part of the protein-coding sequence, the position of the stop codon, or a change in the binding site of a regulator protein. The last mentioned change appeared the one most likely to allow an explanation for the alterations in enzyme activity. Transporter activity also was higher in dogs than wolves, and a one amino acid substitution mutation in the protein primarily involved is thought to be responsible. The authors considered that a change in the ecological niche, giving expanded feeding opportunities near human habitation, may have been the catalyst for the mutational changes being selected for and hence allowed dogs to thrive on a starch-rich diet rather than on meat.⁴⁴ These observations have general relevance to cats.

Cat domestication is considered to have occurred in the Near East region and is considered to be a result of natural rather than artificial selection as found in dogs and other animals. Cat breeds appear to have received genetic markers from five wild cat (*F. silvestris*) subspecies (*bieti*, *cafra*, *lybica*, *ornate*, *silvestris*—figure 3) from various locations.^{45,46} The development of carbohydrate metabolic machinery is not as well-developed in cats as in some other animals.⁴⁷ One possible reason for this could be that felids lack the ability to detect sweet stimuli on account of



Figure 3. One of the contributors to the emergence of the domestic cat (*Felis silvestris catus*), the European wildcat (*F. silvestris silvestris*)

a defect in a gene (microdeletion has occurred) disabling receptor functioning.⁴⁸ Also, it has been suggested that the development of the longer intestinal tract in domestic, in contrast to wild, cats may be a consequence of feeding them with domestic scraps. Further advances will undoubtedly come with the acquisition of detailed nutritional genomics information. Current evidence suggests an enrichment of genes related to protein and lipid metabolism represents adaptation to the strictly carnivorous diet. The role of recombination events has not been investigated, but has been suggested as of potential significance.^{26,45,49} Multiple genes are likely to be involved in domestication and the reverse process—feralization. One attempt to explain domestication in general posits that the changes noted in mammals have occurred on account of deficits developing in neural crest cell representation. These stem cells give rise to precursor cells that are involved in the development of many tissues and cells. Multiple genes are thought to be involved in the changes. Loss-of-function mutations, recombination events, generation of repeat elements, and epigenetic phenomena possibly have been involved, including changes in gene behaviour consequential on changes in methylation status (epimutation).⁵⁰

Concluding comments

The nutritional challenges faced by members of the Felidae can be accounted for in part. Observations on animals undergoing domestication and feralization have provided some answers. Selection for tameness gives rise to some profound changes in physical, developmental, and physiologic characters. It might be expected that over time a reverse process (selection for wildness; lack of ease with humans—feralization) could be observed with these animals. This appears to be the case when generalized behaviours are considered with a selection of small animals (e.g. rats, gerbils, hamsters, dogs).⁵¹ Even though the small felines appear to be somewhat different in that they have a tendency to tameness (i.e. tolerate proximity to humans, show rubbing, and licking behaviour),⁵² it is a common observation that domesticated cats also readily become feral (return to the wild). This is not to suggest, however, that feralization is the exact reverse of domestication. When complex traits are involved, adaption to new conditions may follow independent pathways involving different loci than those targeted during domestication. This might be considered a reasonable outcome as the gene pool available and environmental conditions are different.⁵³

The pressures of competition for food resources, mate selection, and the peculiar aspects of the environment after the Flood would have led to the selection of variants better suited to survive in the new, harsh habitat and perhaps the need to avoid predation themselves. It is also possible that the founder population of felids emerging from the Ark may have already diverged remarkably from the original and that they were already part way along the pathway of animals formerly socialized to humans, becoming less comfortable in their presence. It is important to emphasize that the gene pool represented in the Flood survivors was much reduced over that represented before the catastrophic event for the simple reason that few animals were preserved from the multitude presumably available. It is suggested that opportunity and/or necessity drove the first felids to seek an alternative food source, perhaps much like the vampire finches of the Galápagos now feed on blood from pecking the juvenile feathers of sea birds.⁵⁴

Emotional, nutritional, and other pressures (stress) possibly enabled selection among genetic traits already present to deliver changes in morphology, physiology, and behaviour. Changes in neural crest numbers, their distribution and activity due to genetic modifications appear to provide a unifying basis for the root cause of tendencies towards and away from docility. Variable interactions among genes are also possible and can help to account for the (sometimes) dramatic changes observed.^{26,49} Other genetic events outside the neural crest cells' domain may also be involved. A great deal of detective work is still required to determine the genes involved in domestication/feralization and how they interact to influence physiology, behaviour, and the morphology of animals. It would be interesting to undertake in-depth studies on the genetic profile of ostensibly vegetarian felines⁵⁵ and complete a raft of enzyme activity studies.

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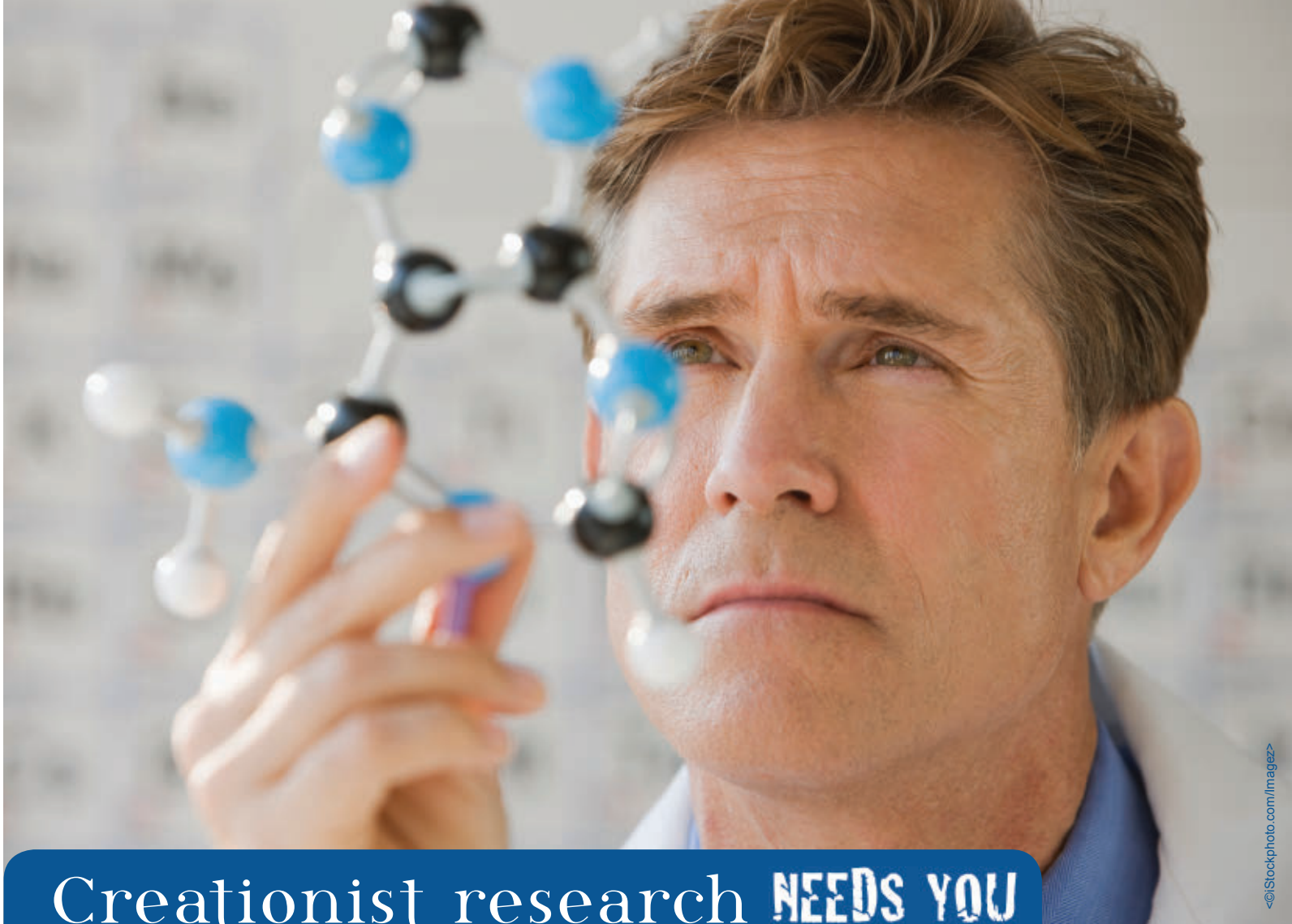
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Creationist research NEEDS YOU

Christians need to keep on providing scientific answers within a biblical framework, and refining our case (including exposing whatever flaws there may be in old arguments). We also need to be ready to respond to challenges by critics.

Faith-funded creationist ministries like *Creation Ministries International Ltd* (CMI) can only do so much, not having access to taxpayer dollars.

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Consider researching a particular area with a view to producing a paper. *Journal of Creation* is a great place to air it. CMI is more than willing to provide refereeing through our contacts. If you are concerned that publishing in a creationist journal might affect your employment, for example, a pseudonym may be acceptable. If you are keen to write, see our instructions to authors opposite.

Remember that the creation/evolution issue is often not so much about *facts* as about their *interpretation*. Often the research results produced by secular institutions operating within an evolutionary framework can be just as useful in providing answers for creationists—it just needs someone to go

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